RAILROAD GAZETTE

FRIDAY, APRIL 20, 1894.

CONTENTS.

ILLUSTRATIONS:	PAGE.
Tunnel of the West Chicago Street Railroad Company, under the Chicago River	280
Locomotive Smokestacks	281
Quirk's Train Tablet Exchanger	282
The New C., H. & D. Freight-House at Cincinnati	283
Sandberg's New 100-lb Rail	284
The Brownley Injector	284
Tubular Iron Cars	284
The King Chain Hoist	285
CONTRIBUTIONS:	
"Green for Safety"	279
Von Borries or Lindner?	279
Spacing Joint Ties	279
Insufficiency of Automatic Signal Records	279
EDITORIALS:	
Air-Brakes and Freight Train Speed	286
Wheel Gage and Track Gage	287
Rating the Hauling Capacity of Locomotives	287
Profit Sharing	287
EDITORIAL NOTES	286, 288
New Publications	288
Trade Catalogues	288

GENERAL NEWS:	PAGE.
Locomotive Building	291
Car Building	291
Bridge Building	291
Railroad Law	291
Meetings and Announcements	291
Personal	292
Elections and Appointments	292
Railroad Construction	293
General Railroad News	293
Traffic	294
MISCELLANEOUS:	
Technical	289
The Scrap Heap	290
American Railway Association	279
Railroad Switching and Yards	281
The Value of Tie Plates in Track Repairs	282
How Shall Operating Expenses Be Reduced?	283
The Delaware & Hudson Controversy	284
Illinois Railroad Commissioners' Report	285
Railroad Matters in Chicago	289
Classification of Railroad Expenses in Reports to the Government	289

Contributions.

"Green for Safety."

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been watching with much interest the different articles that have been contributed to your paper on the proper color for signal lights, and I will relate the following incident, which happened to me, and which caused me to become an ardent advocate of a change in color.

I had charge of the switches that led to the entrance of a large yard. About 25 car lengths from this point there was an automatic electric signal, which controlled the movement of all trains coming toward the yard. One night, the main track being blocked, I set the signal to danger for an approaching passenger train. But, to my horror, the train ran by the signal, and it was with great difficulty that I stopped it in time to prevent a serious accident. I asked the engineer why he had run by the signal. He informed me that the signal was white, and upon investigation this proved to be true. The red lens, by some unknown cause, had been knocked out of the lamp, and as the night was calm the light continued to burn and showed white.

SAFETY.

Von Borries or Lindner?

TO THE EDITOR OF THE RAILROAD GAZETTE:

The letter of Messrs. Hope & Co., which you publish in your issue of March 23, though more nearly correct than the one previously published, still contains errors which should be corrected. My new change valve really comes under the Mallet system, as I declared in my letter of Dec. 15, because it works on Mallet's principles. It differs, however, in one essential point from Mallet's double seat valve of 1886, because it automatically reduces the pressure of steam admitted to the receiver, which Mallet's valve does not. I introduced this valve because I found the starting devices based upon my designs of 1880 insufficient for the requirements of modern passenger traffic. I do not wish to ride my principles against obstacles too high to be overcome, but shall continue to improve the compound locomotive wherever I can.

The difference between these principles and those of Mallet are fully set forth in my paper, and any one interested can judge whether or not they are "slight." If Messrs. Hope & Co. are desirous of giving one name to all two-cylinder compounds, the name should be that of Dawes or another of the old inventors.

As Messrs. Hope & Co. maintain that I failed to discover the "complete balancing" of the high-pressure piston for certain positions, I assume that they have not read my paper carefully, otherwise they would have found on page 7, paragraph 4, that I introduced a check valve for that very purpose long before Mr. Lindner. The only new feature this gentleman has introduced is the imitation of the use of auxiliary steam to certain positions of the low-pressure crank, but this feature is a minor one and was invented long after Mr. Lindner's starting cock and releasing ports.

As to the trials of my valve on the Saxon State Railroads, their purpose was not to determine the relative merits of the two devices in a special case, but they were made because of the insufficient starting power shown by the Lindner devices and others in which the receiver is slowly filled through a small port. In all these engines, the pressure in the low pressure cylinders increases so gradually that progress is necessarily slow. It is this principal defect in Mr. Lindner's device which led the Saxon State Railroads to try my change valve as I am informed by Mr. Bergh, General Superintendent of Motive Power of that system.

Another defect of all starting devices in which the high-pressure cylinder exhausts into the receiver, is the low starting power when the high-pressure valve or piston is leaking, the piston in this case being partly balanced by leakage of steam from one side of the piston to the other.

VON BORRIES.

Spacing Joint Ties.

The Pennsylvania Railroad Company,
PHILADELPHIA, April 7, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been informed that many of the railroads in the United States in laying tracks place the two joint ties 8 in. between bearing surfaces. As our standard is 10 in., I was prompted to ask a vote of our track foremen on the question, as to whether they could properly tamp the joint ties if placed 8 in. between instead of 10 in. I beg to inclose you the result, in which you will notice that only 17.04 per cent. are in favor of 8 in. space while 81.80 per cent. are in favor of 10-in. space. This shows that nearly 82 per cent. of 1,033 foremen voting are in favor of the 10-in. space. They answer that they could not properly tamp the joint ties if they were placed only 8 in. apart.

The question might probably be asked whether it is stone or gravel ballast, as that would appear to have much bearing on the subject; but in one division where the ballast is gravel you will notice that only one out of 14 voted in favor of 8 in., while in a division which is all stone ballast only 6 out of 101 voted in favor of 8 in.

A further comment might be made, that the men would vote in favor of 10 in., because it is easier to tamp ties when they are a greater distance apart, but it is fair to suppose that as the track foremen do not handle the pick or tamping bar, they would look at it from the standpoint of getting a better support for the joint.

VIEWS OF P. R. R. SECTION FOREMEN ON SPACING JOINT TIES.

Division.	Number in favor of 8 in.	Number in favor of 10 in.
New York	17	52
Amboy	1	13
Belvidere	6	16
Philadelphia	6	95
Middle	4	55
Altoona	0	25
Pittsburgh	14	66
W. Penn	3	28
Tyrone	8	37
Bedford	4	7
Lewistown	1	14
Monongahela	3	19
Frederick	5	22
Schuylkill	2	28
C. & Clearfield	6	8
Maryland (P., W & B.)	8	57
Delaware " " "	3	47
Central " " "	4	19
Phila. & Erie } Northern Cen. }	62	165
West Jersey } C. & Atlantic }	19	42
Total	176	845
Percentage	17.04	81.80

(1.16 per cent. undecided.)

JOSEPH T. RICHARDS, *Mem. Am. Soc. C. E., Engineer M. W.*

Insufficiency of Automatic Signal Records.

BOSTON, April 13, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with interest the reports of the working of automatic signals, which are given in the *Railroad Gazette* of March 23 and March 30, but I fail to get all the information I desire (and which they might give) in the data furnished. It is to be presumed that the reports refer to the number of cases of derangement of apparatus, but nothing is said as to the number of trains which were stopped in each case. Unless that is taken into account, any calculations as to the proportion of failures to operations are inaccurate and misleading. The errors introduced may be great or small, but they are indeterminate. The neglect to take into account the number of trains which are stopped in each case of trouble gives the system the appearance of working to much greater perfection than is actually the case, and produces a feeling of confidence and security correspondingly greater than the facts warrant, as it assumes that only a single train is stopped by each case of derangement.

Without reflecting in any way upon the integrity of the officials of the Pennsylvania Railroad, I have little confidence in the accuracy of such reports of the working of automatic signals, where they are stated to have falsely indicated safety, and for this reason: I believe that on all the roads named, the signals stand normally in the all-clear position when no train is in the section, and are so placed that they are set to danger only when the train (or at least a portion of it) has gone past the signal. The engineer or fireman (presumably the only persons on the train whose business it is to observe the position of signals) never see them change, and have therefore no knowledge as to whether they actually do or do not operate. In the ordinary course of affairs such an automatic signal may fail to be set to danger a hundred times without discovery, unless another train follows the first so closely as to reach the signal while the previous train is known to be still in the block. The instances reported only represent that portion of the cases actually occurring (in which the signals stood all clear when they should have indicated danger), *which happened to be discovered,* and there are no means of knowing whether the unknown cases were few or many. From my experience in such matters I am led to believe that but a small proportion of the cases which actually happen when the engineer does not see the signal operate are discovered, nor can they be except in one of two ways, namely: (1) Place a man at the rear of each train to observe the position of automatic signals behind the train, or (2) adopt the practice in use on some roads, of setting each signal far enough ahead of the point from which it is operated, so that the engineer can see that it changes from safety to danger; and then cause him to report the fact at the earliest possible moment should it fail so to do. I am aware of the objections sometimes raised to this position of the signal, in which it is claimed that the signal may be set to danger by the opening of a switch ahead, or from some other cause, at just the moment when the train entering the section should operate it, and that the engineer may thereby be deceived and run into danger of which he has had no warning. I have myself heard of one such case, in which, however, the engineer was inexcusably careless in not observing the signal at the time when his train should have operated it, but only saw it before and afterward. The possible danger of an accident from this cause seems to me to be far outweighed by the certainty of detection of a failure to set the signal when the train enters the section. I have always found that when automatic signals were arranged like those of which you give reports, the records of their operation show many fewer cases of failure than when their working is carefully observed for every train. It appears to me an undesirable if not a dangerous practice to operate automatic signals (the normal position of which is all clear when no train is in the section) so as to be set to danger only when a train has passed them, because of the possibility that they may fail to operate, and thus show safety with a train in the section. Experience has proved that this does sometimes happen, and no pains should be spared to have immediate knowledge of every such case. I have even heard of an instance where automatic semaphores were frozen fast in the all-clear position on many miles of a prominent railroad; and of not one of these failures could the engineer have any warning or direct knowledge.

There is, however, in my opinion, very little risk in thus arranging automatic signals which stand normally at *danger* when no train is in the section, and which are automatically set clear by the trains as they approach the signals in succession. These may be safely operated by the train when it has reached some position in advance of the signal, because in experience thus far, when the apparatus is out of order, failures or derangements have always left the signal standing at danger instead of all clear, and the derangement was therefore immediately discovered. This method of working automatic signals (*i. e.*, standing normally at danger) preserves most of the advantages of observing the change of the signal and does away with the objection raised by those who are opposed to the practice of setting a signal just before the train reaches it. In the tables you publish, and all similar ones, the correct statement would be, "of all the cases of failure which left the signal in the all-clear position, the following happened to be observed."

GEO. W. BLODGETT.

American Railway Association.

The Spring meeting of this Association was held in New York City on Wednesday and Thursday, April 11 and 12. It was one of the largest meetings that the Association ever held, about 100 representatives being present and 80 companies being represented. There has been some increase in membership since the last meeting and the roads in the Association now operate over 142,000 miles of line. The officers chosen for the ensuing year were: President, H. S. Haines; First Vice-President, E. B. Thomas; Second Vice-President, W. F. Merrill. For members of the Executive Committee: C. W. Bradley, of the West Shore, and George W. Stevens, of the Chesapeake & Ohio. All of these are re-elections. For members of the Committee on Train Rules the following roads were elected: Lake Shore & Michigan Southern, Pennsylvania and Seaboard & Roanoke. The first two are re-elections and the latter succeeds the Chicago, Rock Island & Pacific, which was represented by Mr. W. I. Allen.

The date for the general change of time tables is May 13.

The reports of the committees on Car Service and on Safety Appliances showed that nothing had been done, the members of the latter committee being engaged on the Joint Committee which has in charge the matter of signaling. The Train Rule Committee reported various changes in the Standard Code, but they were laid over without discussion.

A communication was received from the Master Mechanics' Association asking the co-operation of the American Railway Association in conducting locomotive tests at Purdue University, and the matter was referred to the Executive Committee.

The main discussion of the meeting was on the report on signaling from the Joint Committee on Train Rules and Safety Appliances. This committee had suggested

certain radical changes in existing practice, and these, together with the proposition to establish minute technical definitions of the different signal systems and their details of operation aroused the most animated discussion that the Association has seen for several years. Among the suggestions presented were that distant signal arms should be colored yellow instead of green, as is the general custom at present; that for night signal colors, green should stand for safety and violet for caution; that two positions of the semaphore should be recognized in block signaling where the controlled manual system is used, but that three be permitted where the ordinary telegraph block system, without electric locks, is used; that a train order signal should always be different in form from block signals; that track circuits should be used for automatic signals where the track conditions will admit; that in automatic block signals the indicator at switches should be so arranged that if the electric current fails the signal will indicate danger; that automatic block signals should go to danger after the head of the train has passed. The Committee was not prepared to argue strenuously in favor of any of these changes, the intention to present them solely as a basis for discussion being plainly avowed; and the whole report was recommitted, with the exception of that portion printed below.

The Code of Definitions was slightly amended, chiefly by omitting reference to absolute and permissive blocking, and the first nine paragraphs as now approved stand in the following form:

1. BLOCK.—A length of track of defined limits, the use of which by trains is controlled by fixed signals prescribed and established for that purpose.
2. BLOCK SIGNALS.—Fixed signals prescribed and established for the purpose of controlling the use of a block.
3. HOME BLOCK SIGNAL.—A fixed signal at the entrance of a block to control trains in entering and using said block.
4. DISTANT BLOCK SIGNAL.—A fixed signal of distinctive character used in connection with a home block signal to regulate the approach thereto.
5. ADVANCE BLOCK SIGNAL.—An auxiliary fixed signal placed in advance of a home block signal, and worked in connection therewith.
6. BLOCK SIGNAL SYSTEM.—A series of consecutive blocks, controlled by block signals.
7. A telegraph block signal system is one which is operated manually, as directed by telegraph.
8. A controlled manual block signal system is one which is operated manually, but by its construction prevents the display of a "clear" signal while the block is occupied by a train.
9. An automatic block signal system is one which is self-operative, whether by mechanical, electric, pneumatic or other device.

The address of President Haines at the opening of the meeting will be found in another column.

New Tunnel of the West Chicago Street Railway Company.

The new tunnel under the Chicago River, just north of Van Buren street, for the cable cars of the West Chicago Street Railway Company, was completed last month. The construction of it has taken four years, it having been begun in February, 1890. The work has been greatly retarded on account of litigation. For six months practically no work was done on it on account of the Warren Springer case which was then in the courts. By reason of this delay the cable road on Blue Island avenue which is to use this tunnel was finished a year in advance of the completion of the tunnel.

With the exception of a short construction in England, on the line of the Northwestern Railway, this tunnel has the largest cross-section of any in the world. Its cost has been about $1,500,000, including the cost of right of way and litigation, and in its construction has been used 2,200,000 bricks for the arch, 5,000 barrels of Utica cement for laying the brick, and 22,000 barrels of Portland cement for the concrete. On account of the nearness of this tunnel to the surface of the ground, all the work has been carried on from above, excavations being made to the required depth, the arch built and covered with concrete, and then filled in above to the required level.

The work in the river section was constructed in coffer dams, one-half of the river being occupied at a time, it being necessary to keep one channel open at all times for the passage of vessels. These dams were made by driving on all sides two rows of close piling well below the lowest point of excavation. These rows of piling were about 16 ft. apart and were backed up with close sheathing, 6 × 12 in., the whole being securely tied together with iron rods, and the space between the piles was filled in with clay well tamped down. As the water was pumped out the interior of the dam was thoroughly braced with 12 × 12 in. timbers extending entirely across the dam. These braces were spaced 9 ft

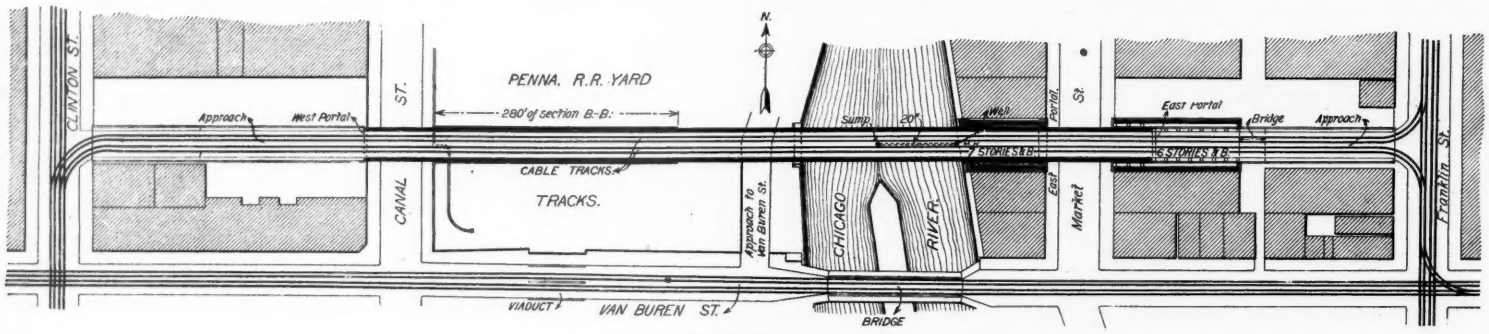


Fig. 1—Plan.

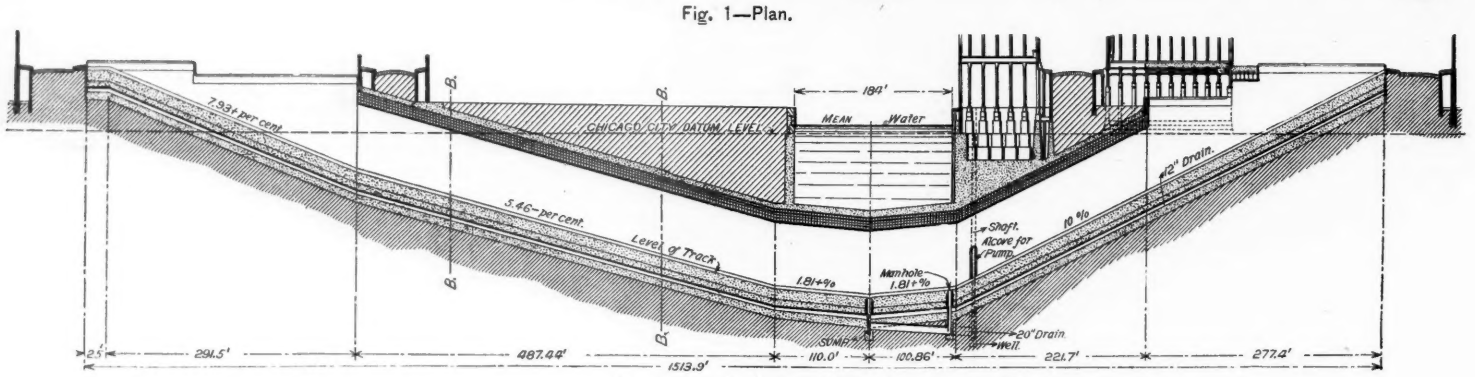


Fig. 2—Longitudinal Section.

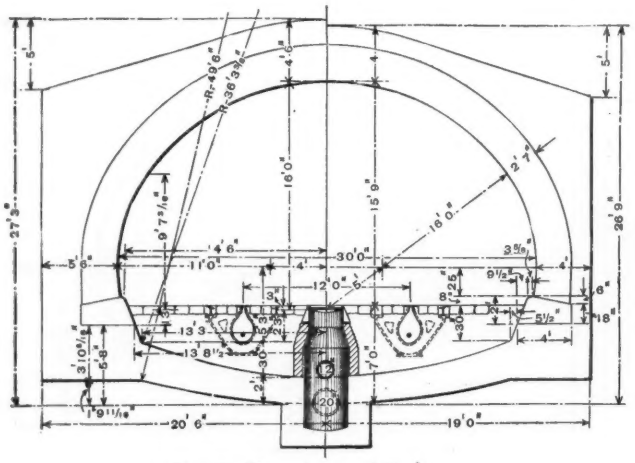


Fig. 3—Dimensions and Sump.

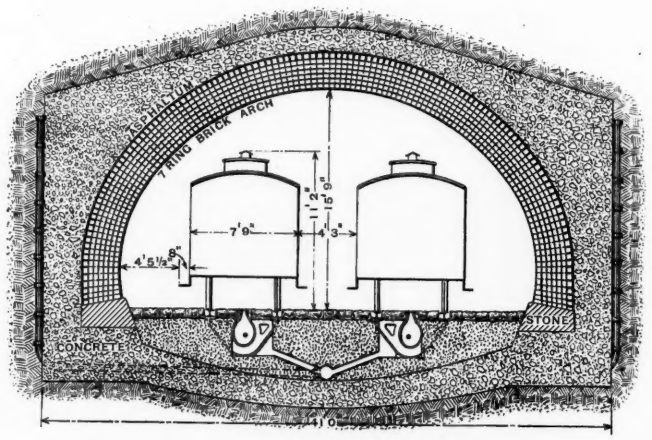


Fig. 5—Section Showing Materials and Drainage.

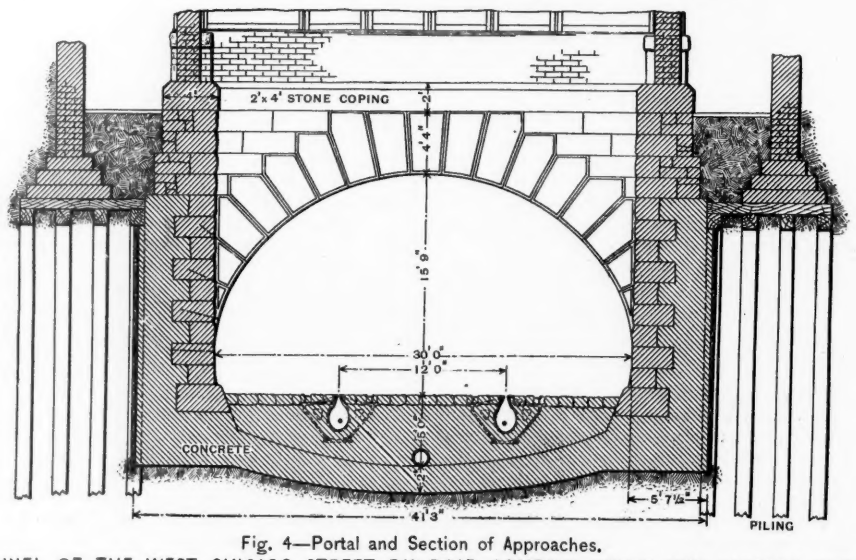


Fig. 4—Portal and Section of Approaches.

TUNNEL OF THE WEST CHICAGO STREET RAILROAD COMPANY UNDER THE CHICAGO RIVER.

centre to center horizontally, and 6 ft. center to center vertically.

The length of the tunnel and approaches from the west side of Franklin street to the east side of Clinton street is 1,513.9 ft., the arch being 15 ft. 9 in. in height above the level of the car tracks and having a span of 30 ft. This leaves a space of 4 ft. 3 in. between two trains of cars that may be passing each other, and 4 ft. 5½ in. between the cars and the walls of the arch. The spans of the Washington and La Salle street tunnels is only 18 ft. 6 in.

Fig. 1 shows the plan of the tunnel and its position relative to Van Buren street. The new bridge of the Metropolitan Elevated Railroad will cross the river about 100 ft. north of the center of the tunnel.

Fig. 2 is a profile of the tunnel and its approaches, showing the gradients. On the east side the tunnel extends under two six-story and two seven-story buildings before reaching the river. At this place is the steepest incline, having a 10 per cent. grade for 499.1 ft. This will cause a much greater strain to be put on the cable than in either the Washington or La Salle street tunnels, the steepest grade there being 5.56 per cent. At the end of the 10 per cent. grade there is a grade of 1.81 per cent. for 100.86 ft., where the lowest point of the tunnel is reached. This is 44.75 ft. below the city datum-line, or 47 ft. below the mean water level of the Chicago River. This dimension is to the bottom of the concrete floor, the distance to the level of the tracks being 37.75 ft. From this point the tunnel rises by three grades, a 1.81 per cent. for 110 ft, 5.46 per cent. for 487.44 ft., and 7.93 per cent. for 291.5 ft. to the level of Clinton street. Directly west of the Chicago River it passes under the Pennsylvania Railroad yards. Considerable time was consumed during this part of the construction as the traffic could not be stopped. Piles were driven during the night and the tracks one at a time taken up and replaced on bridges made of heavy timbers which were put across the excavation. The depth of the earth here above the tunnel varies from 22 to 6 ft. A 12-in. drain composed of sewer pipe extends longitudinally through the tunnel, into which the cable conduits are drained at intervals of 15 ft. by 4 in. pipe. At the lowest point this drain connects with a sump 38 in. in diameter, from which the water is removed through a 20 in. drain to a well, and pumped thence into the Chicago River by pumps placed in an alcove. On the outside of the concrete walls are placed open joint drains at intervals of 50 ft., except in the river section, also connecting with the 12 in. main drain. One of these is shown in fig. 6. It is thus seen that the tunnel has an excellent drainage system, and can be kept free from water except in extraordinary cases.

In fig. 3 are given the dimensions and outlines of a section under the Pennsylvania Railroad tracks. It will be seen that while the thickness of the brick arch is the same, yet there are 6 in. more of concrete in the top of the tunnel and 1 ft. 6 in. more on each side under the Pennsylvania Railroad tracks than in the ordinary section, shown at the right.

Fig. 4 shows a section of the approach and also the elevation of the portal and the position of the cable conduits and drain. The distance from center to center of the grip slots is 12 ft. The depth of the concrete foundation in which the cable conduits are laid is 5 ft., while the floor of the tunnel proper is 2 ft.

Fig. 5 is a section on the line *BB* under the Pennsylvania tracks. It shows the brick arch composed of seven rows of sewer brick, the two outer rings of brick work being laid in asphaltum for a distance of 250 ft. each way from the center of the river. In the remainder of the tunnel only the one outer ring of track is laid thus. This use of asphaltum is something new in tunnel construction and is expected to keep the tunnel dry.

All sheathing was removed from the back of the concrete, permitting the clay to press against the concrete surface as a protection against weather. In this figure the connection of the cable conduits with the 12 in. drain is shown, as also the side drains before mentioned. Outline drawings of the cars are put here to show more clearly the space between the cars and the walls of the tunnels. Danger of being crushed between the cars and the walls is thus avoided.

The tunnel was designed by Mr. Samuel G. Artingstall, the present City Engineer of Chicago, while the work was carried on under the direction of Mr. C. V. Weston, the contractors being Downey & Fitz-Simons, of Chicago.

Railroad Switching and Yards.*

The speaker opened with a statement of the object of switching cars and of the improvements needed to produce better economy in yards. He presented statistics showing that of the engine mileage on the five principal Massachusetts roads for one year 17.74 millions was passenger, 14.12 millions freight and 6.41 millions switching. Nine-tenths of the switching is for freight service, so that this amounts to about 5,765,743 miles, equal to 41 per cent. of the freight train (road) mileage. The switching mileage is generally estimated by the time spent, the allowance being five or six miles an hour. Mr. Turner has tabulated from the reports of these roads the annual expenses chargeable to freight traffic and finds the total to be $11,754,002. This sum is apportioned as shown in the following table:

DIVISION OF FREIGHT AND SWITCHING EXPENSES.

	Percentage of freight expenses.	Estimated percentage of switching expenses.
1. Wages (locomotives)	13.3	20.0
2. Fuel	19.6	12.0
3. Water for locomotives	0.9	0.6
4. Supplies	0.8	0.8
5. Switchmen	7.4	15.0
6. Repairs (locomotives)	7.9	5.0
7. Repairs (cars)	15.8	15.8
8. Repairs (road way)	12.0	9.2
9. Rails	2.9	2.9
10. Ties	3.0	2.0
11. Shops and tools	0.7	0.5
12. Wages of trainmen	14.5	15.0
13. Supplies, train	1.2	1.2
	100.0	100.0

The percentages in the last column are estimates made by Mr. Turner on the basis of his experience; switchmen's wages, for instance, being always a larger item in switching than in roadwork, and locomotive repairs smaller. The total mileage of freight trains and freight switching for the year named, on the five roads, was 19,889,873, making the cost per mile 59.1 cents.

Most large yards have been enlarged from smaller ones without any definite and comprehensive plan and are therefore arranged in such a way that the work cannot be economically done. In 1892 the five roads named owned 1,015 miles of side tracks, equal to 28 per cent. of all the track owned. Estimating the average cost of these side tracks at $12,000 a mile, adding $6,000 a mile for land and $50,000 for yard buildings, makes a total expenditure of $18,325,220, which at 4 per cent. costs $733,008 a year. Assuming that one-half of this is for switching purposes the roads named spent $366,504 a year for permanent way and structures used in switching.

A yard should be laid out so that the work can be concentrated as much as possible. One large yard is better than two or more smaller ones. The yardmaster and foreman can manage a large yard as well as a small one and less engine service is wasted. Switches should be close together, and in large yards the levers should be concentrated in a tower. Cars should always move in the direction of their destination; every backward movement causes loss. Mr. Turner estimates that in some of the older yards, poorly adapted to their present business, three-fourths of the car movement is without useful result. Often a train of 20 cars, to be sorted and placed on four tracks, involves a movement of 21 car-miles and two engine-miles. With a well arranged yard and with the poling system, the same work can be done with six car-miles. Mr. Turner then described the operation of poling, which is familiar to our readers, and added a description of the Williamstown yard on the Fitchburgh Railroad. In one yard which he has examined the same force handles one-quarter more cars than before poling was employed. Poling can be introduced in many old yards for at least a portion of the work, and where introduced will save 20 per cent. of the cost. Less yard room is required, less force is needed to do the same work, lighter engines can be used, fuel saved and fewer cars broken. Wherever gravity switching has been adopted the number of accidents to men has decreased in a marked degree. No general rules can be laid down for designing a yard; the conditions of each case must be studied.

Mr. Turner then referred to a yard of the Pennsylvania road at Philadelphia where switching is largely done by gravity, the grade throughout the yard being 49 ft. per mile. The poling system is used, though the pole comes into play but little, except when cars run hard. The poling engine has a platform car, with seats upon it, which is used to bring back the brakemen from the lower end of the yard. At night lantern motion signals are used to take the place of the chalk marks on the ends of the cars to indicate destinations. There are from 16 to 24 brakemen on duty at a time. This yard has handled 920 cars in three hours, and, counting the movement in both directions, 4,500 cars a day. The Yardmaster states that the cuts average less than two cars each, and he estimates that with old-fashioned methods five engines and 30 men would be needed. Mr. Turner then described the Edge Hill yard of the London & Northwestern, which is familiar to the readers of the *Railroad Gazette*. In France and Germany gravity switching is practiced in some places where, on account of limited room, it is impossible to make a good gravity yard like those at Philadelphia and Edge Hill. On a road, for instance, where the line is level, and it is impossible to make radical changes in the grade, the receiving yard and the delivery yard are located 1,000 or 2,000 ft. apart, and the track connecting them is elevated at the middle so as to make the ascent 1 per cent. from each way. An engine pushes a train out of the receiving yard, the cars are cut apart on the ascending grade, and as they are pushed over the summit they run down and are separated so as to enter their respective tracks. The engine follows and brings back the brakemen.

Mr. Turner presented the following estimates of the cost of switching which he had gathered from certain reports of European experience:

Road.	Cost—Francs per Car. By engine.	By gravity.	Gravity cheaper, per cent.
German government	0.345	0.142	59
Paris, Lyons & M.	0.256	0.167	35
Northern of France	0.203	0.149	30
Swiss Western	.....	0.14	..

An important saving can be made in car service by having a convenient transfer platform at large yards where cars are received from connecting roads. If a car arrives with freight for 10 stations, and there are 10 such cars, a prompt transfer of the freight will save more than half the switching mileage (estimated to be 740 miles if not transferred, 307 miles if transferred) and 100 car-days. In 1892 the five Massachusetts railroads already referred to paid car-service balances aggregating $691,241. This indicates the importance of transferring freight from foreign cars whenever home cars are available; and the only way to keep this expense at the lowest possible point is to have a man of good judgment at the transfer station.

Locomotive Smokestacks.

The design and correct proportion of locomotive front-ends, including the nozzle and stack, are subjects upon which there naturally exists a great diversity of opinion. Under the varying conditions of service and fuel which must be met by the designer, it seems improbable that any one design can be found which will give universal satisfaction. There are, however, certain ones of these conditions that seem to be practically constant, and it seems probable that within wide limits rules can be devised and applied with considerable success.

The design of stack and exhaust nozzle and the relative location of the nozzle may perhaps be considered one of the simplest, though by no means the least important, of these problems. There are, at all events, some conditions that are fairly constant, as the angle of the jet issuing from the exhaust nozzle, and the desirability of its filling the stack before its exit.

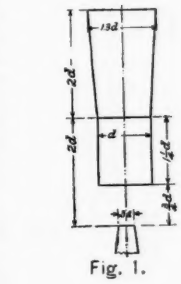


Fig. 1. Fig. 3.

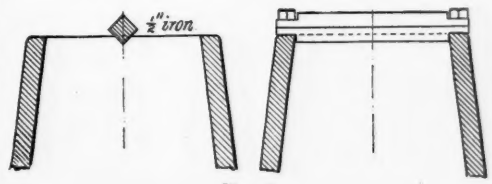


Fig. 2.

Proportions of Locomotive Smokestacks.

As the result of extensive experiments on the Prussian State Railways, Mr. A. von Borries has recommended that stacks be made of the form and proportions shown in fig. 1, in which the area of the stack at d equals one-half the combined area of the flues. By the use of these proportions the steam jet is said to fill the stack at one-half its height. The height of stack shown is the minimum advised by Mr. von Borries, an increase in height and area at top being considered desirable. In case of a stack so short or so long that the steam jet does not properly fill it, Mr. von Borries advocates the use of a bridge of square iron placed on the tip of the nozzle as shown in fig. 2, slightly increasing the size of the nozzle if necessary to make allowance for the obstruction caused by the bridge. This device serves to split and divert the jet of steam, and causes it to fill the stack more completely. It can hardly be considered a novelty in this country, however, as it has long been in use, and has given good service in cases of emergency.

Fig. 3 shows a design of stack worked out for an American road, and based upon German experiments, and deductions made by Prof. Zenner about 30 years ago. In this design area D is equal to one-third the total flue area, and area d from one-thirty-second to one-twenty-sixth of the total flue area. The value of x is given by the formula $x = 5\,(D - 2d)$. We understand that these proportions failed to give satisfaction and have been abandoned. They seem unusual at any rate, and not in accord with the usual practice in this country.

*Abstract of a paper by Mr. E. K. Turner before the New England Railroad Club, at Boston, April 11.

Quirk's Train Tablet Exchanger.

The illustrations which appear herewith show an ingenious, simple and inexpensive arrangement for automatically picking up and delivering train tablets by

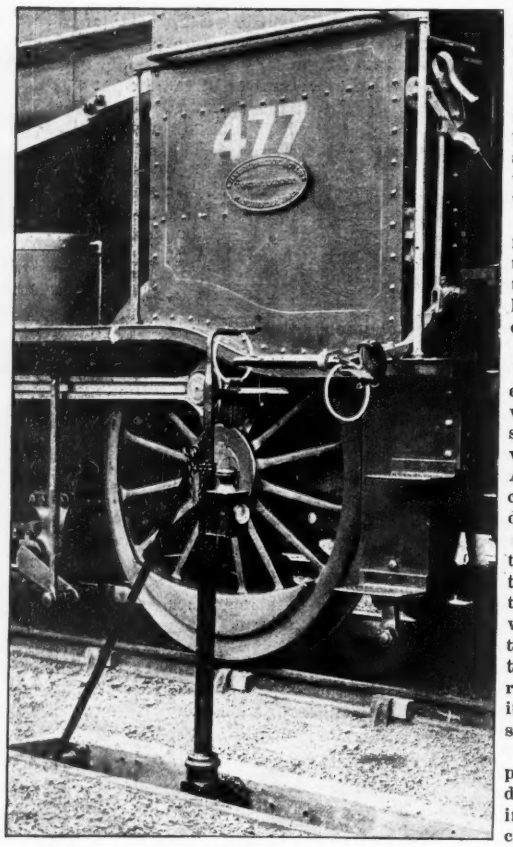


Fig. 1—Quirk's Train Tablet Exchanger.

locomotive engines when running at high speed through stations. The apparatus, which was designed by Mr. W. D. Quirk, C. E., of Sydney, N. S. W., has been adopted by the Railway Commissioners of New South Wales for use on the Great Southern line, which is worked by Tyer's train tablet system, and over which the Melbourne express train runs at high speed.

The electric train tablet and the electric train staff systems have been largely adopted by the Railway Commissioners on the Main Trunk lines of New South Wales since 1888. The railroads of the colony consist of 8½ miles of four tracks, 149½ miles of double tracks and 2,304½ miles of single track, or a total of 2,462½ miles. The whole of the quadruple and double lines are worked under the absolute block telegraph system, and of the single lines 563 miles are worked under Tyer's electric train tablet system, and 436 miles under Webb & Thompson's electric train staff system, thus leaving only unimportant sections to be worked under the old staff and ticket regulations.

In using the train tablets the line is divided into sections varying from 4 to 20 miles in length, with a tablet station at each end of every section. The electric tablet instruments are fixed at each station, containing from 15 to 20 metal tablets or disks each, applicable to the section on either side. No train is allowed to depart from any station until the engineman is furnished with a tablet. Before a tablet can be obtained from the instrument at either end of the section, the consent of the men at both ends of the section must be given, and only one tablet can be taken out of the instrument applying to the same section at the same time, thus effecting the security of the train staff system in regard to trains traveling in opposite directions as well as the absolute block system for following trains.

Previous to this exchanging apparatus being brought into use, the tablet was placed in a leathern pouch attached to a cane or iron hoop, which was handed to the engineman by the station-master as the train passed through, while at the same time the driver delivered the tablet for the section just traveled over to the station-master by a similar appliance. This method had the disadvantage of requiring express trains to slacken speed to enable the exchange to be made, besides which the attention of both driver and fireman was taken up in making the exchange. With the Quirk apparatus the exchange is mechanically effected with absolute certainty at any speed, and the engineman is left free to give his attention to his engine and signals. Each engine is provided with an apparatus, as shown in the illustration, consisting of a lever, receiving arm, delivery clip and pouch, and is manipulated by the fireman. In the normal position the lever and receiving arm are vertical and fitted close to the side of the cab, so as not to impede the driver in walking round his engine. The apparatus is raised and lowered by a small lever kept in place by a spring notch, and is fixed to the engine in such a position as to be most readily worked from the footplate.

There are two sets of ground standards fixed at each tablet station, one for up and the other for down trains, only one apparatus being required on the engine. The mechanism consists of a wrought iron tube column provided with a spring delivery clip attached above, and a receiving arm below.

The standard is pivoted at its base, and when not in use folds down below rail level into a covered timber frame. The latter is securely tied to the sleepers so that its relative position to the track is always maintained. Instead of the large wire or cane hoops previously mentioned, the tablet is placed in a neat, strong leather pouch, secured by buckle and strap, the whole being attached to a ⅝-in. steel ring about 6 in. diameter, which allows for the usual oscillation of the engine when traveling at any speed.

The station-master places the tablet in the ring pouch, fixes his ground gear in its vertical position, and hangs the ring and tablet on the top delivery spring clip; at the same time he fixes on the exchange apparatus a lamp by night, or a white circular disc by day, to indicate to the driver that all is in readiness.

On approaching the first station the fireman lowers his exchanger to the horizontal position, and, as the engine passes the ground standard, the ring and pouch with its tablet is caught by the receiving arm, and on striking a spring buffer immediately releases a trigger which flies up and prevents the ring rebounding. At the end of the engine arm a pad is provided to receive the blow from the tablet taken, thus preventing damage to the pouch or its contents. After the tablet is caught the engine exchanger is at once raised again to its normal position, the spring trigger closed and the tablet taken from the receiving arm. On approaching the next station where the tablet for the next section will be in readiness to exchange as previously described, the fireman places the pouch with the tablet for the section just reversed in the delivery socket and the steel ring fitting into the ring provided for the purpose keeps it in its proper position, so that on passing the ground standard the two tablets are exchanged.

The Webb & Thompson staffs are worked on the same principle as the tablets except that the machines are of different patterns and a staff is carried on the engine instead of a tablet. Mr. Quirk's exchange apparatus can be used with either, but on the sections where this system is in operation trains are not run at high speeds through stations and the exchange apparatus has not been put into use there.

The Railway Commissioners of New South Wales have, after a series of trials, purchased the patent rights from Mr. Quirk for that colony, and the apparatus is in use on the engines running the Sydney and

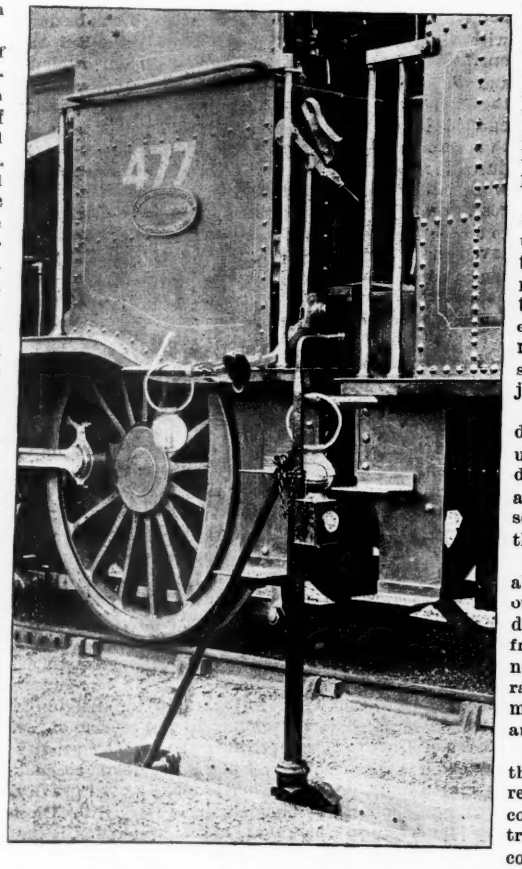


Fig. 2—Quirk's Train Tablet Exchanger.

Melbourne express trains, giving every satisfaction, and it is intended to extend the system to other sections where the tablet is in operation.

The Value of Tie Plates in Track Repairs.

The following is a synopsis of a paper with the above title, read before the Association of Railroad Superintendents at Buffalo on April 19. The paper was read by Mr. Benjamin Reece, M. Am. Soc. C. E. He first points out the advantages in the way of reduced costs of repairs, and in other ways, of keeping a track in good repair at all times, showing that traffic can be handled more cheaply over tracks that are in perfect condition than over inferior ones, and gives the ideal condition of a track. Proceeding, he says that the rapid deterioration of track is due to yielding supports and the abrasion of moving parts. Vibrations are objectionable in so far as they introduce undue stresses or conduce to wear, and those rail supports which cushion or absorb such vibrations are to be preferred. Stone masonry was found, at an early date, to be too rigid support. The true value of the longitudinal bearing system resides in the fact that the superstructure is more nearly integral. I believe fully in the scientific basis of such a system. It was shown by Mr. P. H. Dudly's dynagraph that 720 H. P. were required to haul a train weighing 378 tons at a speed of 55 miles an hour over 80-pound rails, and 820 H. P. on 65-pound rails. It was estimated that it would require 620 H. P. on 105-pound rails.

Unless a rail is sufficiently stiff to transmit its loads, without deflecting between its tie supports, improved fastenings will not prevent the reacting uplift of the rail. Those who at first used tie plates to save the ties soon learned that, great as is the advantage of their use in prolonging the life of ties, their chief economy rests in the saving of labor and preservation of track. Deflection of rail in service cannot be prevented, but track movements due thereto must not be permitted to increase. Tie plates, by mechanically preventing the rail from cutting into the tie, restrict and thereby prevent the cumulative effect of the deflecting movements of the rail. If the rail is securely fastened to the tie, the cutting into the tie is reduced, but this leads to churning ties and requires the constant tightening of fastenings. The advantages of tie plates are most readily shown where most serious difficulties in maintenance are experienced, in shaky swamps, steep grades, sharp curves and busy yards.

With a wood backing, sand grinds the base of the rail rapidly, but with tie plates the sand is at once ground between the metal surfaces and can do but little grinding. In the protection of joint ties the longitudinal plates have proved of great value by preventing the flanges of the angle bars getting a bearing on the ties, which, should it happen, results in unnecessary strains on the track bolts.

Like most engineers and trackmen, I originally attached too much importance to the value of the increased bearing area for distributing the loads which, it was insisted, a tie plate should provide. With wide tie plates, however, if the plate is not sufficiently stiff to depress the tie under its width, the plate bends and its usefulness is at an end; the farther the plate projects beyond the rail flanges the greater the leverage tending to bend it. This leads to the thickening of the material. My experience and observations would lead me to condemn a heavy plate at sight. The crucial test of any plate is a thin plate of such form as will not buckle under the rail, for then the heavy blows are eliminated instead of being concealed as with the heavy plate; the latter resulting in destruction to the rails which the plates sustain.

To preserve the surface of the track the ties must be constantly tamped to compensate for the depression of the rail in the tie; thus when the time for renewing the tie arrives, the entire bed has to be dug away in order to place the new tie below the rail. Having thus disturbed the old bed, several tampings will be necessary to properly restore it. When protected with a tie plate, the rail seats of all the ties are uniform throughout, and the support of the rail on a tie about to be removed will be just as firm as that on a new tie.

Where track spikes are used the ties can be adzed down and the spikes redriven, but lag screws must be unscrewed, the clips taken up, and the ties carefully dressed down to give the clips a new bearing upon ties and rails. So tie plates are almost indispensable when screws with clips are used; on the continent of Europe the two are used together.

I never saw a properly constructed track in reasonably safe condition, where the rail was bodily pushed out laterally, from under a moving train. What really does occur is a gradual canting of the rail. This has frequently caused derailment, and with cars or engine no longer running upon and giving stability to the rails, the rails have been thrown out, and this has been mistaken for the cause instead of being recognized as an effect of the derailment.

After the canted rail is restored to its normal position the bearing area of the engine drivers is considerably reduced; this results in a great loss of power and has compelled the taking off of two cars from each freight train and only as the head of rail would wear down could the weight of train be increased to the capacity of the engine. If tie plates are applied when the new rails are first laid the wear of the rail will be normal, and many men of experience declare that this saving of the rail is a more important feature of the tie plate than is the saving of the tie.

A confusion of ideas coupled with a looseness of expression has led to considerable talk about the shearing of spikes due to the lateral thrust of the rail flanges. I have never yet found a spike which under normal condition had been sheared off by the rail flanges, and there is abundant testimony going to prove that spikes are not sheared by lateral thrust, but are worn under the

head by the vertical and side movements of the rail. The first wear of the spike leaves more room for lateral play, the rail moves from side to side, as well as up and down into the seat which the rail flange has cut into the tie, and the amplitude of the movements thus augmenting the abrasion of spikes and rail flanges constantly increases. Since the tie plates prevent the rail cutting into the ties the vertical movements of the rail are so restricted that this source of wear is practically eliminated, and if the plates are correctly punched several years of service will little more than brighten the face of the spike at the point of engagement with the rail flange.

It has been shown that when ties are afforded the protection of the tie-plates the jumping movements of rail, reduced by cutting in the ties, no longer exists and the abrasion of the spike is prevented. Such, however, is not the case with that wear of the spikes, which is caused by the lateral movements of the rails; these movements, as heretofore explained, are also lever movements, in which the rail, being pushed out in advance of the moving wheel, rests against the outer line of the spikes, reacts so the more distant portion of the rail is thrown in against the inner row of spikes, and unless the radial position of the rail is fixed it alternately runs out and springs in with the passage of the wheels of every truck. In cases where the tie-plates are not used the timber backing which supports the spikes tends to cushion the blows which the spikes receive from the springing rails, so in the softer woods the tendency is rather to loosen the spike by pushing it back into the wood than to cause much wear under its head. When the tie-plates are used, the metal backing which sustains the spikes rigidly holds up them to their work, and the wear is in proportion to the stress and violence of the springing rail. Careful observations show that where the spike holes are closely punched, the radial position of the rail is fixed, and this difficulty is not encountered.

The New C., H. & D. Freight-House at Cincinnati.

A new freight-house for the Cincinnati, Hamilton & Dayton Railroad at Cincinnati is just being completed. The conditions met with in the place selected for the building and the treatment of them are interesting in many particulars; these were clearly set forth in a paper recently read before the Cincinnati Engineers' Club by Mr. Charles Wood, Chief Engineer of the railroad, and the following is a synopsis of Mr. Wood's paper:

The lot selected for the new building is nearly triangular, and inclosed by the main tracks and Baymiller and George streets, and apparently quite unsuited for the purposes to which it has been applied. The streets form the sides of the triangle and the main tracks the hypothenuse. The street grades are about 15 ft. higher at the intersection of the two streets than at the crossings of these streets and the main tracks. The distance along George street is about 684 ft., and along Baymiller street 407 ft. The freight-house proper extends the entire length of George street, and there is besides a covered platform accessible to teams from Baymiller street with a team track on each side to facilitate handling of bulk freight.

The main problem was the design of the principal building on George street and was a question of grades. The street grade was fixed and was about 1 to 45; a one per cent. grade was decided upon as a maximum for the tracks, and a maximum floor grade of 1 in 27 was fixed by the freight department. The problem then was the reconciliation of these grades. The curvature of the tracks offset, to some extent, the one per cent. grade of the same. The above conditions necessitated that the floor be a warped surface. At the west end of the building the street grade (Freeman street) fixed the height of the floor on the track edge at 4 ft., and the maximum height on the street edge at 30 in., so that at this end of the building the track edge of the floor is 18 in. above the street edge. The street edge of the floor continues at a height of 30 in. above the grade of the street until the point where the more rapid rise of the street brings that edge 12 in. above the track edge of the floor which follows the track grade, and 4 ft. above it; thus making the standard grade 1 in 30. From this point the street edge of the floor follows the one per cent. grade of the track edge until such a point that the street edge reaches the level of the street beyond which it continues on the street grade to the east end of the building at Baymiller street. At this end the track edge has diverged at such an angle as to give approximately a slope of 1 in 27. The floor being thus determined, the track edge of the roof was fixed parallel to and 20 ft. above the base of the rail of the track. The street edge of the roof was fixed at 15 ft. above and parallel to the street grade. This, with the panel length of 20 ft., and the loading of the roof, was given as a basis for bids on the structure.

A separate drawing was required for each and every truss, because the warped floor affected the posts, and the roof with its eaves fixed on diverging grades, and at different heights, made the comb follow a diagonal course across the building even where the sides were parallel.

The covered platform between the team tracks is paved with brick, and is approached by an inclined driveway from Baymiller street. It is uniformly 4 ft. higher than the track, [from which it would appear that this yard is to be used exclusively for outward freight.]

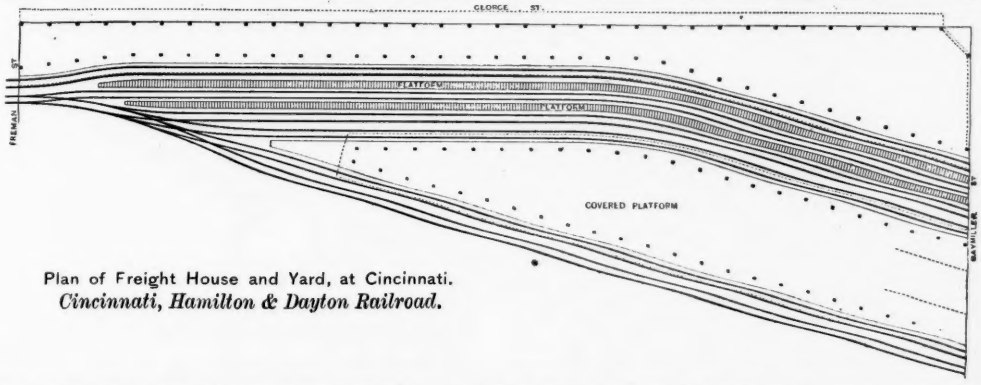
The foundations are ordinary pedestals carried to the old surface or set on well-rolled filling. It was calculated that if capstones were used with wrought iron shoes on the posts, with anchor bolts, the cost of cutting the grooves for the steel shutters would be too great. So cast iron shoes, having a thin outer shell, and filled with concrete before being set in position, were used. The wrought iron post was let into the casting, and a joint made with iron filings and salammoniac. The castings are securely bolted to the masonry.

The posts are four angles latticed, and the trusses are of angle irons throughout. The bracing between the posts is stiff, while that between the trusses, both horizontal and vertical, is adjustable. The purlins are 6-in. channels spaced 4 ft. on centers. They are stayed with rods at the center to take up the sagging and overturning tendency.

The rolling shutters are made in two 10-ft. parts for each 20-ft. opening; the post in the center being hinged so as to swing back, leaving a 20-ft. clear opening. Immediately above the doors on either side of the building is a continuous sash, 5 ft. in height on the track side and 2 ft. in height on the street side. Above this the sides of the building are covered with No. 22 corrugated iron. This corrugated iron is secured directly to the purlins by straps riveted at both ends. There is an office in the middle of the building; there are several fire plugs with attachments; and arrangements are made for lighting by gas or electric light.

The capacity of the tracks is 106 cars.

The ironwork was constructed by the Toledo Bridge Company.



Plan of Freight House and Yard, at Cincinnati.
Cincinnati, Hamilton & Dayton Railroad.

How Shall Operating Expenses Be Reduced?

"Reduction of Expenses in Railroad Operation" was the subject of President Haines' address at the meeting of the American Railway Association in New York City on April 11. Colonel Haines opened by referring to the fact that the first managers of railroads were the engineers who had invented and built them; that their successors, when the business increased with great rapidity, were men skilled in the art of transportation, and that these have in turn been superseded by the traffic manager, who in the sharp competition of late years has come to be the controlling factor. But the efforts to take away each other's business have been pursued with such zeal and ingenuity that the traffic officer has got about to the end of his rope and the operating officer now has the almost impossible task of squeezing out a dividend from the fund set apart for operating expenses.

The operating officer must remember that although he is bound to give *safe* service and maintain the condition of the property, he is not bound to give *improved* services at the expense of his stockholders. In the present stress most managers have reduced their forces, then their stock of supplies, then the quality of supplies, so far as seems possible without starving the road and without danger, and finally wages are reduced. The perplexities of the manager in this connection were vigorously set forth, and the temptation to ease up on the organized employees and lay a heavier load on those who are not able to offer so much resistance, was referred to.

To apportion the reduction as between men and materials is a difficult problem. Two-thirds of the ordinary expenses go to salaries and wages. The manager who operates his road at 66 per cent. of the gross earnings is expected to maintain the same percentage when earnings fall off. But there are many items which he cannot control, such as legal expenses, insurance, bridge and track material, fuel, car mileage balances, etc., so that to reduce expenses 10 per cent. you must reduce about 13 per cent. on three-fourths of the total amount. Colonel Haines estimates that on an average road, say 500 miles long, earning $6,000 a mile, the expense will divide up as follows (assuming a total of $2,000,000 or two-thirds of the earings):

Administrative department	$180,000	or 9	per cent.
Roadway department	400,000	" 20	"
Machinery department	740,000	" 37	"
Transportation department	300,000	" 15	"
Freight and passenger department	380,000	" 19	"
Totals	$2,000,000		

The percentage of total expenses in each department which goes for wages varies materially and is about as follows:

In administrative department	28 per cent.
In roadway department	55 "
In machinery department	59 "
In transportation department	75 "
In freight and passenger department	89 "

"On such a road as I have used for an illustration, out of a total expense account of $2,000,000, about $1,270,000 would go for salaries and wages, and of this amount about $410,000 would be paid to enginemen, firemen, trainmen, switchmen and telegraph operators. Where these classes of employees are protected against reduction of wages by contract, the total reduction must fall upon those classes which are not so organized, and whose wages would amount in all to about two-thirds of the payroll account. Under such conditions the result of an apparent reduction of ten per cent. in total expenses would be to reduce by 20 per cent. the salaries and wages of all officials and employees whose pay was not fixed by contract. . . . In the case which I have worked out as an illustration, if a reduction of 30 cents per ton had been made on a considerable volume of traffic, coal, for instance, 10 cents would have come out of the fund available for fixed charges and dividends, three cents out of the vouchers paid supply men, etc., and 17 cents out of salaries and wages, that is, if the reduction was uniformly distributed."

Colonel Haines then went on to discuss the continued shrinkage of rates on competitive traffic. "Why is it," said he, "that authority should be given to traffic officials arbitrarily to reduce rates, regardless of the cost of performing the service?

Because the men who are responsible for gross earnings are responsible for nothing else. They have gone on from year to year, each striving to snatch as much as he could from the common reservoir of traffic, and the swelling tide of the nation's prosperity kept the bowl ever full and overflowing. The contest in which each sought to get the largest share became so exciting that all other considerations were set aside—not only considerations of cost and value of service performed, but even of good faith, and, I may say, of common honesty. In what an off-hand manner five cents would be taken off a rate of 25 cents per 100 lbs. for a 1,000 mile haul! Yet the rate of 25 cents was only half a cent per ton-mile, and the cut of five cents was a reduction of 20 per cent. in the total rate. And I have known such sweeping reductions to be made in a vaunting way, on the spur of the moment and in a spirit of resentment because of some offensive action by a competitor. The time has arrived in the development of this country's resources and of its railroad system, when such a policy in the management of competitive traffic cannot be persisted in without disastrous consequences. The increase in the volume of such traffic is proportionately less year by year; the bowl is no longer overflowing. But the competitors are increasing; year by year others are tapping the reservoir. Either the volume of tonnage must increase more rapidly than the rate diminishes or the total revenue from competitive traffic must decrease. That is just what is taking place, and the shortage must be made good by reduction in operating expenses.

The real conditions of the problem cannot be discovered by figuring out average rates per ton per mile; that will do for Wall street brokers and legislators, but we move freight by carloads, not by tons, and it is by car-miles and not by ton-miles that the cost of service should be reckoned. Add to this the cost of terminal service and you can make a rational estimate of the probable profit or loss on a given movement of freight.

"To the traffic officials the stockholders must now look for relief. The prosperity of their property is no longer in the hands of the operating officials. Human ingenuity seems to have about done its utmost to give cheap transportation by rail. Every available invention has been adapted to that purpose, and if the limit of economic results has not yet been attained, it has been so nearly reached that the small percentage yet to be saved can only be gained by painful methods more characteristic of a country and of an industry tending to decay than of a great people full of energy and resource and of the greatest factor in modern civilization."

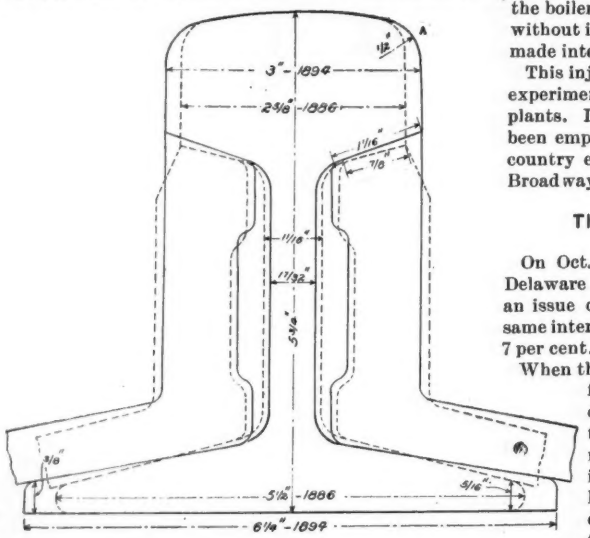
Sandberg's New 100-Pound Rail.

The engraving shows Mr. Sandberg's sections for a 100-lb. rail. The full lines show the section of 1894, just issued, and the dotted lines give that of 1886, which we have shown before. This new section is the heaviest of a series designed for weights of from 30 lbs. a yard up to 100. The relative areas of the two sections are given by percentages in the following table:

	1894.	1886.
Head	46	43
Web	17	22
Flange	37	35

The principal advantages of the new section as compared with the old are stated by Mr. Sandberg as being an increased bearing for the rail base of three-fourths of

an inch; for the head of three-eighths of an inch; for the fish-plates of three-sixteenths of an inch. Mr. Sandberg is now having some of his new sections rolled in order that he may certify that there is no difficulty in



Sandberg's 100-lb. Rail, 1886 and 1894.

rolling them. He anticipates that the new section will get rid of the necessity of using tie-plates. He thinks also that the new distribution of metal—that is, an increased percentage in the flange and decrease in the head—will enable him to avoid the great chemical hardness which American engineers seem to be in favor of, because of the greater physical hardness that will be obtained in the head by the greater rolling down of the material in working. He has preferred to use an upper corner radius of half an inch instead of accepting the American Society's radius of five-sixteenths, and he considers that this is better practice for Europeans. The sharper corner radius may answer very well in America, where all of the rolling stock is carried on bogie trucks.

The Brownley Injector.

Herewith are given illustrations of a new patented injector designed for stationary and locomotive boilers. A special feature of this injector is the absence of valves, the only part approaching a valve being the conical way-plug shown in the sections, and marked *M*. The working of the injector can be readily understood from the engravings. It consists of steam and water inlets, shown in fig. 2, a lifting chamber, *C*, and forcing chamber, *J*, and the overflow and boiler passages marked, and a single cock, *M*. The admission of steam and water are shown and its progress through the injector by the direction of the arrows, the overflow and passage to the boiler being marked.

To start the injector the cock *M* is turned to the position shown in fig. 2, the steam is admitted through the inlet and heads *F* and *G* to the tubes *H* and *K*, through which it passes to chamber *D* and well *J*, and through the cock to the overflow. The passage of this steam exhausts the air from the chamber *C*, when water takes its place, and accompanies it to the overflow. When a good flow of water discharges from the overflow, the cock is turned so as to make direct communication with the boiler, and closing the overflow

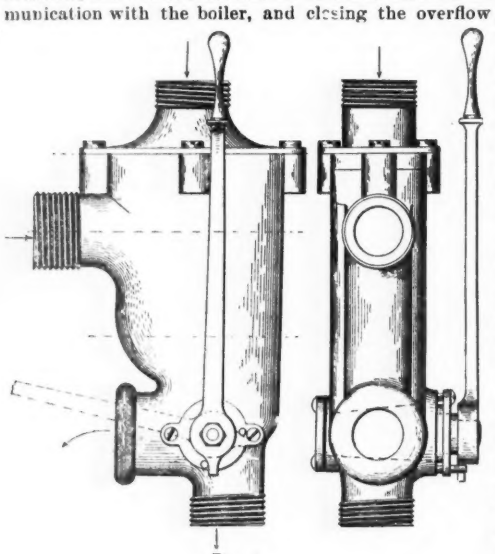


Fig. 1.

also shutting off the chamber *D*. The well *J* is curved laterally to the left to get the passageway into the overflow, and so that the direct force of the feed shall be upon the casing and not upon the plug

The following advantages are claimed for this injector: That it is strong and simple and without valves. It may be attached either to the boiler or to the steam pipe which drives the engine. Shaking and jarring will not cause it to break. It will lift hotter water than the usual forms employed. Variations of the steam pressure will not cause it to break. If a check valve or feed pipe leaks, the plug as designed acts as a check and prevents the boiler from emptying. Any part may be removed without its being sent to the factory, the parts being made interchangeable.

This injector is not entirely new, it having passed the experimental stage and having been used on numerous plants. It has found special favor on tug-boats and has been employed upon locomotives. It is handled in this country exclusively by the Young Lock Nut Co., 150 Broadway, New York.

The Delaware & Hudson Controversy.

On Oct. 1 $4,829,000 of the 5 per cent. bonds of the Delaware & Hudson will mature, and will be retired by an issue of $5,000,000 new stock, which is to bear the same interest as the $30,000,000 stock outstanding, viz., 7 per cent.

When the matter came before the Board of Directors for consideration two very distinct opinions developed as to the right of subscription to this stock by the shareholders. One party, represented by Col. Le Grand B. Cannon, insisted that rights should be given to shareholders at 75. The other party, led by President R. M. Olyphant, of the company, desired the rights to be issued at par. The latter party was in the majority and prevailed. The stock is selling between 141 and 142. Holders of each 100 shares, worth say 142, can subscribe to 16.66 shares at the rate fixed—say par. The profit in the exercise of these rights would be as follows:

16.66 shares at $100 cost	$1,666.00
16.66 shares at 142, market value	2,365.72
Profit on rights given to 100 shares	$699.72

The Cannon party consists of Le Grand B. Cannon, R. S. Grant, Daniel H. Bristow, Samuel Spencer and Johnston Livingston. The Olyphant party consists of the remaining eight directors of the Board, viz.: James Roosevelt, William H. Tillinghast, Alfred Van Santvoord, James A. Roosevelt, Cornelius Vanderbilt, Alexander E. Orr, Chauncey M. Depew and Robert M. Olyphant. The Cannon party maintains that in view of the fact that there was a large surplus in the company's treasury, the stockholders should, in a measure, share in the same through a division. They make the point that the company has on its books a surplus of $7,200,000, and in addition to this $2,000,000 premiums on securities held by the company, all of which is to the credit of the dividend fund. Rights given at 75, instead of par, would be a matter of but $1,250,000 or a little more than 4 per cent. upon the outstanding capital of the company. This 4 per cent. would about offset the difference between the amount earned and the amount paid in dividends as shown by the annual report of last year, the amount earned being 10.71 per cent. and the amount paid 7 per cent. Further the Cannon party cited the precedent established in 1890 when $5,500,000 bonds, then maturing, were retired by an issue of stock at 75.

The Olyphant-Vanderbilt party made the following claims in a circular recently issued to shareholders: The $1,250,000 of the surplus which it would be necessary to distribute to shareholders, should the rights be issued at 75 instead of at 100, would have to be borrowed or secured by a sale of securities in the Treasnry. The company now has no floating debt, and the policy of the minority would compel it to incur such liabilities or decrease its safety funds. Every year the company diminishes its capital by the coal it mines and sells, and the accumulation of a surplus has been for the purpose of offsetting the depletion of its coal. (This coal reserve, it has been estimated, would be exhausted in 60 years.) When credit is slowly recovering from the shock of the recent panic, and all business is greatly depressed owing to restricted production, light sales and low prices, the company deemed it unwise to draw on its surplus for $1,250,000 to pay what practically amounts to a cash dividend.

On these issues the fight started. So bitter became the contest that other issues entered, and it is now said by the Olyphant-Vanderbilt party that if it is defeated at the election it will mean the resignation of the present management. The Cannon party says that this is exactly what it is after, and the quicker such action is forced the better it will be for the company.

In the controversy a skeleton or two has been dragged out before the shareholders. For instance, some time ago the directors' board appointed a committee to make an investigation into the affairs of the company and report. This committee employed expert accountants to go over the books; a report was rendered, and, in conformity to recommendations therein, changes were made in the method of handling the company's coal, whereby the various selling agents now have equal rights. This report also made the recommendation that inasmuch as the chief revenues of the company are derived from the railroad business, the head of the company should be a practical railroad man. This second recommendation was never acted upon, President R. M. Olyphant not deeming it necessary to resign and the directors not seeing fit to force his resignation. However, since that time it is said that the administrative power has gradually drifted from President Olyphant's hands into those of General Manager Young, of Albany, the working head of the company, Mr. Olyphant retaining the head of the financial department.

It is said that Mr. Cannon is the largest individual holder of Delaware & Hudson stock, and that he controls more stock than any other one man. A year ago he became dissatisfied with the management of the Olyphant party, and with the aid of Vanderbilt support put into the directorate certain representatives. One of these, Mr. Samuel Spencer, of Drexel Morgan & Co., while taking no active part in the controversy, has remained true to Mr. Cannon. The others, of whom there are at least three, are with the Olyphants. The enormous weight which the Vanderbilts carry with the investment public, owing to the fact that their name stands for stability, together with their own personal support, has thrown the balance of power into the Olyphant camp and there is now but little doubt that this party will win the election which is to be held on May 8. At the close of last week they held proxies for 109,000 shares against the necessary amount of 150,001 shares, and it is generally conceded in financial circles that they will carry the election. It is also a growing belief that the controversy will show to the stockholders, from an inside point of view, the exact status of the company, and that in time there will be changes in the management that will more nearly represent the ownership of the stock.

Colonel Cannon sailed last Saturday for Europe, but his followers have not given up the fight.

Tubular Iron Cars.

The paper read by Mr. G. R. Joughins before the New York Railway Club, in January, has revived the some what dormant interest in metal car frames, and has called forth a paper by Mr. E. C. Spalding, General Manager Southern Iron Car Line, in which he gives his experience with 6,000 "tubular" iron freight cars.

In 1886 Mr. Spalding had charge of mileage and repair accounts on the Western & Atlantic Railroad, and all shops on the road reported repairs in detail, and the different railroads exchanged movement and mileage

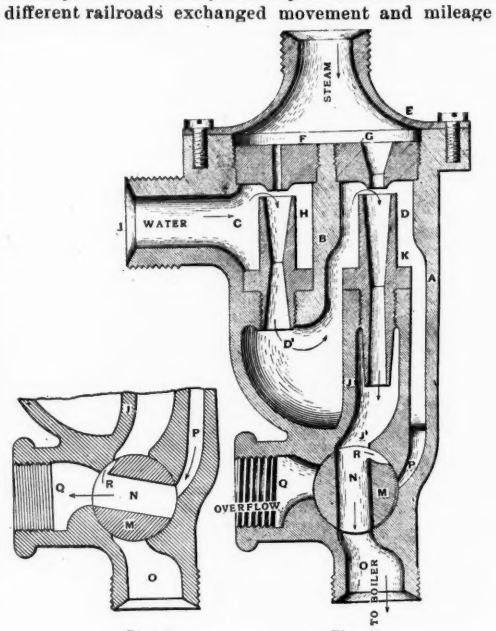


Fig. 3. Fig. 2.

The Brownley Injector.

reports. From the accounts and reports he has prepared tables which show the earnings and repairs for freight cars ten years ago. One of these tables for wooden box cars of different ages is given below. The cars were in general service and the table gives the average revenue, expense, net loss or profit and per cent. of profit or loss for one year.

Age.	Mileage.	Money.	Repairs.	Net Profit.	Net Loss.	Per C't Profit Per Car	Per C't of Loss Per Car
1 Year.	13,149	$ 98.62	$ 9.58	$ 89.04	.....	17 1/2	.....
2 Years	13.478	101.08	38.13	62.95	.....	12 23/100	.....
3 "	10,475	78 56	48.24	30.32	.....	6	.....
4 "	9,847	73.85	45.85	28.00	.....	5 2/3	.....
5 "	9,881	74.11	57.31	16.80	.....	3 3/10	.....
6 "	9,349	70.12	70.74	.....	62	.....	1/10
7 "	8,968	67.26	60.74	6 52	.....	1 1/3	.....
8 "	9,250	69.37	55.49	13.88	.....	2 3/4	.....
9 "	9,295	69.71	49.80	19.91	.....	4	.....
10 "	7,656	57.42	53.67	3.75	.....	7/10	.....
11 "	7,864	58.98	43.03	15.95	.....	3 1/8	.....
12 "	.....	.....	.....	.....	.....	.....	.....
13 "	.....	.....	.....	.....	.....	.....	.....
14 "	6,249	46.87	53.08	.....	6 21	.....	1 1/8
15 "	6,400	48.00	47.02	98	.....	2/10	.....
16 "	7,470	56.02	82.19	.....	26 17	.....	5 1/2

NOTE—Profit gradually decreases on car as age increases until it reaches sixth year, then owing to heavy repairs done, car is greatly improved and strengthened, and makes a small profit each year, until it arrives at tenth year, after which it is again a net loss to company. Average earnings for ten years, $76.01: average repairs, $48.95.

Mr. Joughins in his paper gave his experience with 50 iron flat cars leased to his road. These flat cars are the weakest of the tubular iron car equipment, as experience

shows that the tubular iron car is much stronger when braced with sides required in building coal cars, and his experience with these 50 flat cars necessarily deat with the tubular car in its weakest state. On account of the general interest in the experience of Mr. Joughins. Mr. Spalding gives his experience with several thousand cars of this type.

The 6,000 cars controlled include box, hopper-bottom gondolas, flats and plain-bottom coal cars. When these cars were first built it was expected that the repairs would be reduced to such a minimum that little provision was made for repairs. It was not thought necessary to establish repair stations or supply roads with a stock of this material, but it was not long before orders were coming in from roads for castings, and complaints soon followed that cars were being delayed waiting for these castings. The fact that special orders were necessary and the time consumed in receiving the castings caused a natural irritation to the roads; and the impression was formed that the cars could not be repaired without special material and tools.

In order to locate the weak points of the car, a careful record of each casting ordered was kept, and the discovery was made that 93 per cent. of all castings ordered were for repairs to the draft-rigging. By referring to Mr. Joughins' paper it may be noted that his experience with these cars showed that in the original construction the center sills were omitted in order to decrease the weight of the car, a heavy wooden sub-sill, 6 × 12 in., has been applied between the bolsters which has been successful beyond the most sanguine expectations. This heavy wooden sill remedies the weakness referred to by Mr. Joughins and saves the end-sill and draft-rigging. A record of cars which have been equipped with this sub-sill for two years' active service shows the draft-rigging and end-sills are in practically as good condition as new. The Nashville, Chattanooga & St. Louis Railway has equipped a large number of its cars with this device and reports that it has lessened its repairs to end sill and draft-rigging fully 75 per cent. The East Tennessee, Virginia & Georgia Railway has been operating 1,100 gondolas and 500 box cars for the past four years; also gives its experience with this improvement and expresses its belief that it will overcome the difficulty experienced with the draft-rigging.

In presenting these facts, it is not to advocate the adoption of this type of car, but to make a candid statement of experience, and under the belief that it will prove interesting, as there are 8,000 cars of this type in active service and nearly every road handles them.

Mr. Spalding continues: We frankly admit that the draft-rigging was weakened in the original construction by the omission of two extra tubular sills in the center of the car. As soon as the draft-rigging was found to be defective, steps were taken to overcome this trouble, and after various experiments it was finally decided to adopt the heavy wooden sub-sill between the bolsters. Over two years ago several of these cars were equipped with this device and subjected to very severe practical tests, and after active service for two years the end sills and draft-rigging are in perfect condition. These sub-sills have been applied to 30 per cent. of our equipment, and the improvement will be continued as rapidly as possible.

This sub-sill is being applied to cars built prior to 1892. Since that date a new arrangement of draft arms, devised by Mr. T. L. Chapman, was used, and up to the present time we have not received an order for any pieces for repairs to the new draft-rigging. Our experience with this new draft arm has been so satisfactory that cars in future will be equipped with these draft arms, in addition to applying the sub-sill.

The general opinion of mechanics is unfavorable to the tubular iron car on account of the trouble which they have experienced in ordering special castings and the fact that the car is delayed until these castings are received. If we eliminate over 90 per cent. of this trouble by improvements, then we can reasonably expect a corresponding reaction in favor of the car.

The cost of repairs upon these cars has been much less than wooden cars of the same capacity and age, and in this cost of maintenance we include the heavy repairs which we are now making in thoroughly overhauling the cars before the sub-sills are applied.

It has been said and generally accepted as true by railroads handling these cars, that they cannot be repaired properly without special tools, but this is a mistake, as we can prove by our repair shop in Atlanta. We have not found it necessary to employ special tools or machinery in making all necessary repairs. We find that ordinary mechanics, with regular tools, after a few days' experience, can easily make all the necessary repairs. We have no engine power or machinery connected with our shops. We are operating several hundred wooden cars, and can repair the iron cars more quickly and cheaply than wooden cars of the same age.

It has been suggested that the iron pipes under our gondolas would be greatly affected by the acids from the coal running through the floor, but this trouble is avoided by giving these tubes a coat of black paint every three or four years.

We require a few more months in which to thoroughly overhaul our equipment and make the improvements above described and we shall then overcome at least 75 per cent. of the trouble and irritation which these cars have caused in the past.

The King Chain Hoist.

The engravings show a chain block that is *new*, at least to the American market. The block was invented by a German named Luders, who holds letters patent from Germany, England, Belgium and the United States. In European countries it has been in use for some years in many large manufacturing establishments, including the German and British navies and the Krupp establishment. It has been introduced in this country by Charles G. Eckstein & Co., of New York, with the belief that the record it has made in Europe will be maintained in this country. The block is of the usual form, the hoisting apparatus consisting of a worm shaft that engages in the hoisting chain-wheel, the shaft being turned by a small chain windlass.

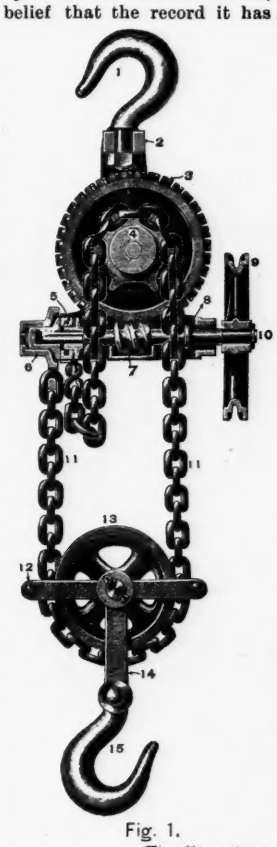


Fig. 1.

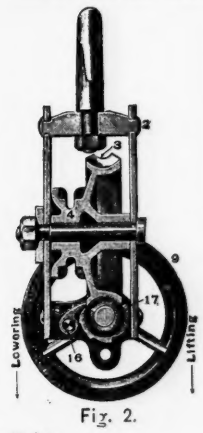


Fig. 2.

The King Chain Hoist.

A special feature of the block is that all parts are of wrought iron or steel except the three chain wheels numbered 3, 9 and 13, fig. 1. All the shafts are of steel, the worm shaft being of extra quality, case hardened. The frame is of homogeneous steel plate, and all the other parts except the wheels mentioned are of the best wrought iron. The friction rings and bearings are of gun metal, marked 5 and 8. The wrought iron parts are dropped forgings, and are interchangeable, and the block throughout is of turned and fitted work. The chain is imported and tested before going into the block, and every block is tested after it is assembled. Ten different sizes are manufactured whose lifting capacity ranges from 1,000 to 20,000 lbs., the weights varying from 72 to 600 lbs. and the lifts from 9 to 12 ft. The prices are from $25 to $340, from which a liberal discount is made. Every block is designed so that one man weighing 165 lbs. can lift the maximum load of the block.

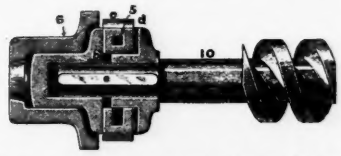


Fig. 3.—Worm Shaft and Friction Brake.

The patented features are shown in figs. 2 and 3, which is a friction brake. Fig. 3 shows this friction brake attached to the worm shaft. It consists of a collar *d* fixed to the worm shaft and a steel cap *b* fitted to the end of the shaft and both held by a feather *e*. Bearing against this collar and cap is a hollow gun metal ring *c*, having ratchet teeth on its outer circumference shown at 17, fig. 2. When raising a load the thrust of the worm shaft is taken by a steel button shown at the extreme left, fig. 3, in the socket 6, the collar and the cap and the ring rotating with the shaft. When the worm shaft is reversed for lowering, the teeth on the collar 17, fig. 2, engage with a pawl 16, which holds the ring stationary while the collar and cap revolve with the shaft, thus causing friction on both sides of the gun-metal collar, which is sufficient to prevent the worm shaft from being turned by the weight of the load, but which may be moved by a slight pull on the hand chain. To increase the friction a thin washer or ring of vulcanized fiber is inserted between the collar and gun metal shown in the engraving. The shaft is thrust to the left against the gun metal automatically by the chain wheel when there is a load in the hook 15, which thrust produces the friction. The gun-metal ring is made hollow and filled with lubricating compound sufficient to lubricate all fractional surfaces.

One of the annoying features of chain hoisting blocks is the trouble which is usually had with the chain becoming stretched or worn and not engaging properly in the hoisting or windlass wheels. Special pains have been taken in the designing of this pulley to avoid that trouble, and as will be seen from the illustrations there is not only a sprocket wheel, but there are grooves in which the alternate links fit to prevent slipping or cramping. All blocks are guaranteed and samples will be sent for trial to manufacturing concerns soliciting the same.

Illinois Railroad Commissioners' Report.

The 23d annual report of the Railroad and Warehouse Commission of Illinois has been issued by the Commissioners, W. S. Cantrell, Thomas Ganan and C. F. Lape. It is for the year ending June 30, 1893, and is dated Dec. 1. The part devoted to grain inspection is for the year ending Oct. 31. One of the first paragraphs in the report is that which we see in nearly every such document, a complaint that the railroad companies do not send in their reports promptly. The Commissioners state that their predecessors bothered the railroads too much with formal proceedings in complaints which were really informal and often vague and unsubstantial, and a code of rules for proceedings before the Board has therefore been prepared. The Commissioners have inspected the railroads of the state, traversing 10,201 miles of track, and they find that "the physical condition of the railroads of Illinois is approaching perfection as fast as money and brains can bring such condition about." *How much* money is being used they do not state, and we are therefore left in doubt as to when the goal will be reached. Reference is made to the complaint of insufficient train service on the Belleville & Eldorado Division of the St. Louis, Alton & Terre Haute. The matter was unsettled when the report was made up, but we notice a recent press dispatch (April 12) to the effect that the Attorney-General of the state has instituted a suit in the circuit court to compel the company to run a passenger train as ordered by the Commissioners.

Under the head of safety appliances the Commissioners speak very highly of the Hall automatic signals. Last September, during the heaviest of the World's Fair traffic, they inspected the workings of these signals on the Illinois Central between the Twelfth street station and Kensington, about 16 miles, and from their general examination of automatic and manual block signals they conclude that the Hall is among the best. It not only "apparently covers all of the requirements of safety," but it is reasonable in cost of installation and in maintenance. The Managers of the road inform the Commissioners that not a single accident occurred on that part of their line protected by block signals during the World's Fair traffic which could be attributed to defects in the block system. The average number of daily trains handled was between 700 and 800, and of passengers carried during the Fair period 9,600,000, exclusive of through passengers.

The number of signal levers erected by the various individual companies in Illinois as footed up from the tables is as follows: Union Switch & Signal Co., 1,351; National Switch & Signal Co., 312; Johnson Railroad Signal Co., 279; Lake Shore & Michigan Southern Railway, 11; C., C., C. & St. L. Ry., 44.

Attention is called to the desirability of further legislation concerning the law empowering the Commissioners to compel repairs to defective roadways and bridges. Under the present statute there are so many legal delays that the Commissioner who resists the blandishments of the railroads must have a very stiff backbone.

The report of the engineers of the Board has been heretofore referred to in the *Railroad Gazette* (March 2).

The statistical part of the report shows the length of railroad in Illinois to be 10,315 miles. The earnings and income are shown for the whole of the lines operated by the companies reporting, and also for those portions of the lines lying in Illinois. Under the latter head (Illinois only) the following statistics appear:

Passenger earnings	$23,136,095
Freight earnings	52,312,074
Total earnings, including miscellaneous	78,761,644
Other income	7,121,508
Total	$85,823,152
Operating expenses	$55,210,762
Taxes paid in Illinois	$3,733,305
Passenger earnings per mile, cents	2.409
Freight earnings per ton per mile, cents	1.187
Average passenger journey, miles	25.92
Average freight haul, miles	81.50
Gross earnings per mile	$7,615
Expenses per mile	$5,363
Net earnings per mile	$2,282
Miles of stone ballast	1,310
Bridges aggregate length, feet	293,456
Trestles, aggregate length, feet	670,137

Twenty-three passengers, 246 employees and 533 other persons were killed, and 399 passengers, 2,664 employees and 288 other persons were injured during the year. The totals, 802 and 3,751, are both a good deal larger than for the preceding year. One employee was killed in every 292, and one injured in every 27.

The volume contains, besides the rules of practice, before referred to, the laws concerning interlocking at grade crossings and the rules of the Board concerning the same, the grain inspection rules, the railroad laws of the State and lists of officers of all the roads. The statistical information reported by the roads is shown in tabular form, the same as in the report of the Interstate Commerce Commission, though in some respects in less detail.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 73 Broadway, New York.

After May 1, The Railroad Gazette office will be at **32 Park Place,** *one block west of the Post-Office.*

EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The members of the American Railway Association have done the expected thing in postponing action on the radical changes in signal practice that were proposed in the report of the Joint Committee on Train Rules and Safety Appliances. There was a large attendance at the meeting, and the discussion was lively for a day and a half, but of course there could be no agreement on changes in rules necessitating such widespread changes in practice, without more than a day and a half of discussion. The questions can now be considered more intelligently on their merits among the members at their homes, and if a decision is reached in a year and a half it will be quick time. The Committee has set members to thinking and given them something precise to think about, and that was all that was expected, no doubt. To put green lights in the place of white, to introduce yellow as a color for semaphore arms and violet as a night color are innovations which the great majority are going to agree to only after a good deal of study, if at all. This careful consideration has already been gone through with by those railroad officers who take a special interest in signaling; but these must now wait for the others to catch up with them. Even in the case of changes that can be made without concerted action among different roads, it may be well to wait a little so as to have a stronger movement when it starts. One of the changes which need not wait, however, is the painting of the signal arms. The Committee recommended yellow for distant arms only, leaving home arms red, as now. But why not make them all yellow? The Pennsylvania lines west of Pittsburgh have used yellow on all kinds of arms for five years or more, and have made the practice their standard. Surely there is no company whose standards are more carefully selected or which can be more confidently accepted as free from objectionable features. And if any one wishes to go to the other extreme, he can look at the numerous roads whose semaphores are so smoky and dirty that no one knows what color they are. This practice, familiar to every one, has never been found dangerous, so far as we know, and therefore it justifies the use of any kind of paint, except red, green or white.

The greatest single element of value in this work of the signal committee is the same as that in the work of making the standard code seven years ago, the expulsion from railroad men's vocabularies (and from their mouths) of a large variety of inexact terms (though this comes only after a considerable time), and the substitution of a reasonable number of clear and simple rules and definitions for a heterogeneous lot which no two men 500 miles apart ever agreed upon. The real reform is in the clarification of ideas, of course; but as people sometimes do not like to admit that they have changed their minds, we call it a reform in terminology. The code of signal definitions is not complete, nor is it even perfect as far as it goes, but it is probably as good as we can expect at present. The trouble with all the work of this Association is that every forward movement must stop just where it ceases to have unanimous consent, and unanimous consent, except to the multiplication table (and sometimes to the Decalogue) is hard to get. This limitation is especially noticeable in the suggestions concerning signal practice that were appended to the Committee's code of definitions, as, for instance, that about distant signals and where they ought to be used. The true theory in this matter is that stated in the Erie road's reply to the Committee, that the distant signal is a vital feature of any block system that is intended to provide for greater safety and for an increase of the capacity of a railroad. When this point comes to be generally appreciated we shall hear less about the introduction of the block system hampering instead of facilitating the move ment of trains.

We have referred to the simplicity of the change to yellow signal arms. The change to green lights for all-clear is almost as simple, though it must be carried out all at once, of course (unless we first adopt a new color for distant signals). In a letter which we recently received from an officer of the London & Northwestern the use of green for all-clear is referred to as having been adopted by the *great majority* of English roads, indicating that there must be many of which we have not received direct information. Whatever reasons there may be for delay, lack of knowledge concerning the convenience and safety of the new plan cannot be called one of them, as long as we have this extensive English experience to learn from. And the English way of getting along without a new color is not without its lessons for us. Red is used for the caution color, and the *location* of the signal is the only thing that tells the runner that it is not a stop signal. In other words, all depends upon his thorough knowledge of all the signals on his route. With the very long and satisfactory experience that has been had with this arrangement, the only objection that an American can make to it is that the runner does wrong in passing a red light. If, now, we adopt violet, we remove this theoretical objection; and if, in making the violet sufficiently clear and bright, we make it almost red, we still avoid the theoretical objection; while as for the practical objection, the English experience shows that there isn't any. In other words, a red light will do no harm on a caution signal post if only we can conscientiously call it by some other name. We do not forget that this argument may necessitate the use of a hand-motion signal when it is desired to give a caution indication at a home signal, but that is not an insuperable objection.

Some members of the Master Mechanics' Association are somewhat aroused by the considerable number of failures of boiler plates purchased under the ordinary specifications or without specifications. It is evident that some of the present specifications are inadequate, and that they differ so much as to compel plate-makers to carry a large stock, for plate that will meet one specification will not do for others. The committee appointed by the Association will recommend a standard specification this year, and probably this is the most important topic that will come before the convention. The price of steel has dropped so much that those railroad companies which would not buy high-grade steel a year ago can now purchase the best material for the same price as was formerly paid for an inferior quality, and there is now no longer any excuse for using anything but high-grade plate for locomotive boilers. The proposed standard specifications will undoubtedly call for better material than has heretofore been generally used. It appears from the experience already gained, with steel plate in service after it has been tested, that it is necessary to examine plate in three distinct ways before a safe knowledge of its characteristics can be had. It must be examined chemically, for it has been clearly shown that a reliable plate cannot be made from steel that has not a proper chemical composition, although by careful manipulation an ordinary plate can be made from ingots of poor composition. Proper manipulation benefits the material, but will not give a good plate from a bad composition. Tests in a pulling machine are necessary to determine the ductility, elongation, reduction of area and ultimate strength, accurately, so that the material may be properly placed in the scale of quality; but supplementing this there must be bending tests both crosswise and lengthwise of the rolling, as well as tests with a drift pin, in order to fully establish the character of the material and its toughness. The most careful buyers go further than this and demand that the process of manufacture shall be watched by the inspector to see that all possible care is taken to prevent mechanical defects that might escape subsequent laboratory tests, such as laminations, "cold shut"s and internal strains. Some even specify that the bloom shall be well hammered before rolling, and that the ingots shall be rolled crosswise of the plate to the full width and then rolled lengthwise to the proper thickness. The cracking of firebox plate, which is the evil that gives the most trouble in service, will not be removed entirely, even when the highest grade of material is used, although, no doubt, many of the failures are due to the use of improper materials. Care in washing boilers by using only hot water, washing frequently, keeping the heating surfaces free from scale and always waiting for the firebrick arch to cool before drawing the water out of the boiler, will very much reduce the failures of firebox sheets.

Apparently the question of the consolidation of the Master Car Builders' and Master Mechanics' associations is not a burning one; that is, it does not burn except in the bosoms of those who might lose something by a consolidation, and yet it is a question that has been considered seriously by some of the best men of both organizations, and which it is worth while to think a little about. It might or it might not be a good thing; at any rate, there is a good deal to say in its favor. The associations are very closely allied in the functions and interests of the membership, and in the composition of the two societies. An inspection of the lists of members will show that 24 per cent. of the names in the Master Mechanics' list are found also in the list of the Master Car Builders. Obviously, there is a certain waste of energy and time in going through the merely routine business of two organizations, when all of that business could be done quite as well by one. Out of the seven days spent in the sessions of the two associations at their last conventions, a considerable percentage of the time was spent in other business than reading and discussing reports and papers; that is, was spent in merely running the machinery. The members who wish to attend both conventions must spend pretty nearly two weeks doing it, putting in three days of one week and three days of the succeeding week at the conventions, and spending the intervening two or three days as they may. Now, it is possible that the work could be done better and in less time if there were one association with two sections, say, the locomotive section and the car section, both to sit at the conventions on the same day, one section in the morning and the other in the afternoon. The day's work would be no harder than that to which the members are accustomed at home, and in this way they could probably do in three, or at the most four, days all that is now done in six or seven; to say nothing of three or four days wasted between the two conventions. Under the present arrangement a good many members cannot possibly attend both conventions, for they cannot be away from their duties two weeks. It constantly happens that some of the best men go to the conventions Monday night and leave Thursday not to return for the second convention. It seems quite possible that a larger and more important attendance could be had by the organization suggested. The economy in money might not be very important. In fact, there might be no actual saving of money, for what would be saved from duplication of salaries and office expenses might very profitably be spent in increasing the facilities of the central office and in committee work. We take it, in fact, that money economy is not so much the object aimed at by those who are in favor of consolidation as economy of time. It is worth considering carefully if one association could not do all that is done now in one convention of one week instead of two of two weeks, for that is what the present arrangement amounts to, and we call the attention of members to a number of expressions on the matter published in our last issue, p. 259.

Air-Brakes and Freight Train Speed.

Some years ago when the question of the use of air-brakes on freight trains was much debated, those of us who urged the introduction of the improvement used to say that greater speed could and would result. Now the equipment of freight cars with air-brakes has gone so far that we may begin to inquire what the consequence has been.

It is somewhat difficult to separate cause and effect in individual instances; that is, to say how far greater average speed has followed from the use of air-brakes or how far air-brakes have been brought into use because of the demand for greater speed. It is difficult

too to separate the causes which have resulted in increased speed, which has been due not only to better command of the train by the engineman, but to competition, to better signaling, to improvement in yard and siding accommodations, to better engines, and so on. But it is possible by collecting experience and opinions to get at some approximate notion of what air-brakes have brought about in this way, and to that end we have recently made some inquiries of men who have used air-brakes considerably in freight service.

One superintendent of motive power sums up the result of his own observations and of the opinion of division superintendents on his system by saying that the effect of the use of air-brakes on freight trains has been to increase the average speed principally and the maximum somewhat. A few air-brake cars next the engine permit the engineman to maintain speed nearer to meeting points, or rather to stopping points, which saves time and results oftentimes in a train being advanced a station in its meeting point with other trains. Freight trains can follow each other more closely with less risk, and the accidents due to breaking in two have diminished as the men have become trained in handling the brakes. The actual increase in speed has been on his lines from 10 to 15 per cent, and a conservative estimate places the average increase that ought to be got in general practice at about 8 per cent.

Another superintendent of motive power on a road that has used air-brakes very extensively says that they have put freight trains on the same basis as passenger trains, so far as speed is concerned. On through freights and stock trains the speed is usually that of passenger trains, and freight trains often carry a flag for a passenger train. The average time of way freights cannot be reduced so much because it depends so largely on the amount of business to be done at way stations.

Another motive power man, also on a system that has used air-brakes a good while and extensively, says that his freight trains are now run safely at from 30 to 40 miles an hour, where the former scheluded speeds were 15 to 20; he thinks that the time with air-brake freight trains could be reduced from that of the hand-brake trains to about one-half, and this might be still further decreased on double track lines.

Another officer sums up his opinion by saying that air-brakes have doubled the speed of freight trains. He sends us a sheet showing freight trains run over a division 160 miles long, which are scheduled at from 23 to 36 miles an hour from one division terminal to another, which means probably an average of 40 miles an hour between stations, and he thinks that the maximum would be 50 if not 60 miles. Some short trains on that division, without air-brakes, average 27 to 28 miles an hour, or say 40 miles between stations. The engines on all of these trains have driver brakes and air-brakes on the tender.

It will be observed that there is a pretty wide variation between the lowest and the highest estimate of the possible average increase in speeds. Such a variation would naturally be expected considering the different conditions on different lines and divisions. The reader need not suppose that we consider the subject exhausted in these few notes; we shall be glad to get further reports of experience.

Wheel Gage and Track Gage.

Mr. Archibald A. Schenck, Chief Assistant Engineer of the New York Central & Hudson River Railroad, has presented before the American Society of Civil Engineers a paper which is a valuable addition to the discussion of the relation between wheel gage and track gage. It is a report made by Mr. Schenck to the Chief Engineer of the New York Central, and was brought before the Society in the hope of calling attention to the desirability of joint action between the Society and other associations to secure proper relation between wheel gages and track gages. Mr. Schenck investigates this somewhat knotty problem graphically, having prepared full size drawings, using the standard 80-lb. rail of the New York Central and the M. C. B. standard wheel. By means of these drawings he is able to present more clearly than can be done by figures the interference of wheel flange with frog point and the wear of wing rails by wheels with hollow tread.

Mr. Schenck's principal conclusions are that the Master Car Builders should adhere to the wheel gage of 1885, that is, maximum 4 ft. 5⅛ and minimum 4 ft. 5¼ between the backs of wheels; and that a definite rule fixing the maximum false flange is called for. Nominally this maximum and minimum wheel gage still stands, but the M. C. B. rules of interchange permit the acceptance of wheels varying from 4 ft. 5 in. to 4 ft. 5¼ in.

Mr. G. W. Rhodes considered this subject very carefully in a paper read before the Western Railway Club in January of 1893, and printed in our issue of Feb. 3, 1893. He also recommended holding the maximum to 4 ft. 5⅛ in. and he recommended further a standard maximum limit for the thickness of wheel flanges. The M. C. B. Association has a minimum flange gage, but no maximum, and it is found that wheels are cast and accepted with flanges so thick that wheels gaging 4 ft. 5⅛ between the backs will foul the ordinary frog point by ⅛ in. He further suggests uniformity of gage of track. Mr. Schenck's paper develops the fact that not only are there the well-known nominal track gages of 4 ft. 8½ in. and 4 ft. 9 in., but that there are actual variations in those gages arising from confusion as to the point from which these gages are taken. Generally the gage is tangent to the lower corner of the rail-head, but he finds instances in which it is taken at mid-height of the rail-head. To further confuse the matter, flangeways in frogs and for guard-rails are often measured between the upper corners of the rail-heads, and these flangeways vary from 1¼ to 2 in., two widths being used on the same road in several cases which he has collected.

Mr. Rhodes' observations of the dangerous thickness of many flanges, for which, as we have said, there is now no maximum limit, are borne out by Mr. Tatnall in an elaborate paper on this subject, published in our issue of Dec. 1, 1893. The present standards, so far as there are any, are based on a standard flange 1¼ in. thick. But Mr. Tatnall found from measurements of the wheels under 800 cars that a large majority measured 1¼ in. between the points where the head of the rail touched the flange and the back of the flange; 32 measured 1⅛ in. and 55 measured 1 9/16 in.

From these measurements he shows that, on very many of the cars now running, wheels will strike the points of frogs on a 4 ft. 8½ in. track by ⅛ in., and that 4 ft. 8½ in. tracks have 4 ft. 8 11/16 in. gage wheels running over them. If the rails are of the later pattern with vertical sidesand 1/16 in. corner radius, matters are even worse. Four per cent. of the wheels measured by Mr. Tatnall have a gage of 4 ft. 8¾ in., and they are being jammed along over thousands of miles of track that is only 4 ft. 8½ in. gage. Is there any wonder that derailments are common, and that frogs are short lived?

Would it not be a good idea for the American Society of Civil Engineers to appoint a committee to confer with the Master Car Builders' Association committee already appointed and to try to agree upon standards fixing the gaging point of track, the width of flangeways, the thickness of wheel flanges, and the gage of wheels? Any standards recommended by the two societies in common would be very likely to be accepted and recommended by the American Railway Association and to prevail widely to the gradual abolition of the present confusion.

Rating the Hauling Capacity of Locomotives.

Ever since the first attempt was made to run trains on schedule time there has been a strife between the operating and motive power departments of railroads over the proper rating of the load to be hauled by each class of locomotive and the causes and failures to make time. The stereotyped report for conductors when arriving late is "failure to make steam." This was probably the report of the conductor on the first train that failed to make schedule time. It is quickly written and requires no thinking. When the motive power department is asked to explain, it appears that in each case the operating department was a little more at fault than the motive power department. The defense will show numerous cases like one we remember two or three years ago between Baltimore and Philadelphia. Many reports of "failure for steam," demanded explanation. The line between the two cities mentioned is decidedly undulating and in many instances an opposing grade in either direction is immediately preceded by an assisting grade, down which the speed may be considerably increased to help over the opposing grades. In several instances it happens that signal towers are located between the two grades. In looking for the cause of the delays it was found that the signalmen were in the habit of holding the signals at danger until the trains had nearly reached the tower. This made it necessary to reduce speed on the assisting grade and gave no chance for a "run" for the up grade, and resulted in delays to freight trains, and the loss of a minute or two here and there to passenger trains. Generally, however, when the operating department is at fault, the true cause of these delays is that the locomotives are overloaded for the speed expected. Delays for which the engine really is to blame we will not discuss now, as we are considering only the relations between the two departments. Making good engines and handling them to the best advantage is one subject, and carrying out Mr. West's injunction to co operate for the benefit of the company instead of working for the selfish interests of the locomotive department, is another; it is the latter we now speak of.

As a basis for rational treatment of this matter it is a good thing to have an arbitrary standard, as near right as may be, and let each department work to it as well as it can. The motive power department could say how much each class of locomotive could haul over each division of the road at a given speed, and that department could then be held responsible for delays caused by failure for steam when the stated load was not exceeded; the operating department to be responsible when the stated loading was exceeded. On the Mexican Central, the operating department is furnished with prints showing the rating for each class of locomotive on each division and what each class will haul between any two stations. This was worked out by Mr. F. W. Johnstone, Superintendent of Motive Power of the road, and has been described in the *Railroad Gazette*. Prescribing a standard in this way is not a panacea; it will not put sand on the rail and it will not always expose the runner who lies about the slipperiness of dew, but it is better than a total lack of system.

Recently Mr. R. M. Galbraith, General Master Mechanic of the St. Louis Southwestern, has calculated and tabulated the hauling capacity of the various classes of locomotives over each division of that road, with the expectation that the rating would be put to the use intended. In computing the tonnage rating use was made of resistance tables furnished by several locomotive builders, modified in some cases by experience gained from experiments made on the road. The rating has been checked frequently in the following way: Whenever an engine is compelled to "double" a hill with a train which it ought to take up at one trip, or loses time in other similar ways, the weight of the train has been obtained, and in each case investigated it was found that the locomotive had been overloaded. The rating has never been put into effect on account of the difficulty experienced by the transportation department in obtaining the weights of the contents of cars. The extra work involved in doing this is in fact what has thus far prevented the general adoption of some system of rating the loading of locomotives. But thus dropping the matter does not settle it, for the variableness in trainloads is likely to grow worse instead of better with the increasing use of cars of great capacity (which must often be loaded at far less than their full capacity), and motive power superintendents who have difficulty in satisfying the trainmasters will do well to urge the adoption of the custom of putting weights on running slips. If a superintendent declines to adopt this practice, why should not the master mechanic insist that every car shall be assumed to contain its full marked capacity (and 4,000 lbs. more; that is the customary allowance in billing on many roads)? We do not wish to encourage a "scrap," but merely suggest this as a legitimate argument.

The table shown herewith gives the rating of each class of locomotive on each division of the main line of the St. Louis Southwestern, as calculated by Mr. Galbraith, together with maximum grades. The rating is for freight trains, and the average speed 15 miles an hour. The weights given are exclusive of the weights of engine, tender and caboose.

Division and Direction.	Maximum grade, opposing, feet per mile.	Loading for 8-wheel engines, net tons.	Loading for mogul engines, net tons.	Remarks.
Birds Point-Jonesboro, south.	*43	1,013	1,554	Help into Jonesboro.
Jonesboro-Birds Point, north.....	26	815	1,222	
Jonesboro-Pine Bluff, south..... ..	38	710	1,015	Help on Gilkerson Hill, and in cold weather double Roe Hill.
Pine Bluff-Jonesboro, north.....	38	912	1,368	With help or double Gilkerson Hill.
Pine Bluff-Camden, south.....	55	337	504	
Camden-Pine Bluff, north.....	53	354	532	
Camden-Texarkana, south.....	66	272	414	
Texarkana-Camden, north.....	66	272	414	

* The helping engine is on this grade.

Profit Sharing.

Most of the schemes for profit sharing that have been adopted and carried out by manufacturers in this country have been of a character that was not adapted to the railroad service, and most of the schemes that have been adopted or proposed by railroad directors have been, in our view, impracticable or worthless; and in consequence of this we have hardly ever discussed the plan except to condemn it—or rather to condemn the proposed application of it. But the fundamental principle is sound, and there are circumstances where it works well in practice, and we take pleasure in copying the following open letter, issued by the Association for the Promotion of Profit Sharing:

In anticipation of a revival of business . . . we

would invite your attention to the importance of introducing some form of profit sharing. The method of paying a dividend to the workmen out of profits as they are realized annually has been approved by most of the economists of Europe and America as thoroughly practical, and advantageous to both the employer and the employed. Profit sharing can be adopted by an employer without risk of loss, inasmuch as he assumes under it no obligations except such as are to be discharged from profits actually made. His prerogatives as manager and his rights as proprietor are not curtailed. Profit sharing would establish a more friendly relationship of common interest between working people and the employer. This would be the surest pledge of industrial peace, and the firmest support in times of commercial distress. The employee by his diligence, care and economy can actually create an additonal profit to be used in supplementing regular wages. Profit sharing includes the payment of the best wages current, and promises a bonus beyond this, which, experience shows, the interested workman can invariably produce in good times. Profit sharing, as a principle, may be applied in a large variety of ways. We invite applications for full information concerning the history and results of the system, as it is now in operation in many establishments, small and large, in Europe and the United States. The address of the Secretary of our association is 25 Beacon street, Boston, Mass.

The signers are: Carroll D. Wright, Washington, President; Francis A. Walker, Boston, and N. O. Nelson, St. Louis, Vice-Presidents; N. P. Gilman, Boston, Secretary; R. Fulton Cutting, Alfred Dolge, R. R. Bowker, New York; Henry R. Towne, Stamford, Conn.; George H. Chace, Fall River, Mass.

Three points in this letter contain the gist of the argument. First, all schemes of this sort involve paying full market rates for labor, with a bonus, beyond that, for excellence. Second, the profit-sharing principle may be applied in a variety of ways. This means that premiums to firemen for fuel saving, to trackmen for good track or to freight conductors for clean records, are included in the matters taken note of by this Association, so that the information concerning the general subject, which the Ascociation gathers and freely gives out, is available to railroad superintendents and is likely to prove useful to them. Third, the time to adopt any such change is when wages are increasing or tending to increase. This is the point that we would emphasize.

Schemes for paying profits or premiums to employees are of little interest to a railroad superintendent when his allowances are so small that he is in constant fear that he will have to reduce his pay rolls; but when there is a prospect that the pay of the men *must* be increased, which is pretty sure to be the case some time in the future, and may be the case within a year, then is the time to discuss the best method of doing this; and the scheme under consideration is one of these methods.

Railroad discipline has peculiar difficulties. The most usual method of punishment, suspension from service, is objectionable, and of doubtful effectiveness. Some superintendents employ it but little or not at all. Fines are in favor on only a few roads, are felt by many to be illegal, and, while seeming to the employee to be a full reparation for the injury that he has done, seldom are such in fact. Personal reprimand by the superior officer, the most rational punishment, where it is practicable, is a method which in railroad service fails of its best results from a variety of causes. And all these methods are open to the general objection that punishment for deficiencies is never so good as a reward for excellence.

This last point is the great argument for paying bonuses; and whenever it is possible to increase the compensation of employees, in however small degree, the subject of bonuses or premiums at once becomes important, for it affords one of the most equitable ways of making the increase. A horizontal increase, applied to all alike, rewards the efficient and the inefficient equally, and is devoid of any special element that affects the conduct of the men. A premium or a prize incites a man to compare his work with that of others, leads him to think where before he was thoughtless and inspires an emulation which is pretty sure to be worth much more than it costs.

It is discreditable to railroad management that pay is seldom or never increased except to keep the quality of the service from deterioration. More attention ought to be paid to the sound principle of increasing pay for the purpose of getting better service. To do this discrimination must be exercised, and such discrimination always proves profitable.

The payment of premiums in track service on many roads, and in train service on a very few, has shown railroad men that the principle is not wholly inapplicable to their business. Now is a good time to see if it cannot be applied more extensively.

The fashion of going in bands of 100 to 1,000 now prevails among tramps to such an extent that one needs to read up carefully every day in order to know how many "unemployed" there are at large, and whether or not the next application for coffee at his kitchen-door may not be from a regiment instead of from a single individual. Coxey's band reached Cumberland, Md., this week, and from thence took passage to Williamsport on a canal-boat at 52 cents a ton, prepaid. O. R. C. The press dispatches state that this is 12 cents a ton higher than the rate on coal for the same distance. Presumably the usual live stock release was executed, with an allowance of one man in charge free, without a return pass, though nothing is said on this point. At Elkton, Md., 60 men were reported on Wednesday as marching from Philadelphia toward Washington. Fry's army was near Terre Haute, still on foot, apparently. A band of about 900 is in Iowa east of Council Bluffs. This must be the crowd that was driven out of Utah by the courts and the militia. Evidently the Union Pacific put the "bums" through to the Missouri River in good time. A dispatch from Guthrie, Oklahoma, reports that 300 men have engaged passage to Washington in freight cars. The city authorities of San Francisco have decided, according to the reports, to pay the transportation of another crowd to Chicago. Things are rapidly coming to a pass where the railroads will have to adopt a vigorous policy and firmly maintain it. This last-mentioned move of the San Francisco authorities is illustrative of the motives which govern in this matter nearly everywhere. Instead of dealing with the vagrants on any rational policy, each town or city takes the easiest method of transferring the burden to some other town or city, and the railroads have to stand the cost of carrying the men, the risk of accident or other disturbance and much of the reproach for inflicting the nuisance upon each new community. This is an old trick of municipal officers. As long as they pay full fare for paupers the railroads cannot object, of course; but when freight cars are used and the rates are made very low it is a question whether the road is not a party to the imposition. And if a road voluntarily carries carloads of tramps for nothing it must be admitted that the protests of mayors and others are entirely justified. But here railroad superintendents can readily shift the boot to the other leg, for the negligence of city and town authorities and magistrates is just what has kept the tramp nuisance in existence as a menace to the safety of railroad travel for these many years past.

On Friday, of last week, a strike was ordered throughout the main line of the Great Northern Railway, west of Laramore, N. D., by the American Railway Union, and the press dispatches since then have contained a variety of statements to the effect that the road was "completely tied up." The reports are evidently very incomplete and one-sided, however, and the officers of the road refuse to say anything on the subject, so that it is impossible to tell how seriously the business of the line is crippled. The American Railway Union is a comparatively new organization, of which the chief is Eugene V. Debs, and the engineers', conductors' and other older brotherhoods profess to have no sympathy with the strike, although it appears that some of their members have joined in it. The Great Northern main line is about 1,800 miles long. For the first 320 miles west from St. Paul, there are two passenger trains each way daily. Beyond that and on nearly all of the shorter lines, of which there are a dozen or two in Minnesota, the time-tables, as shown in the Official Guide, generally call for only one train each way daily. The principal exceptions to this are the lines between St. Paul and Morris, Minn., and the Eastern Minnesota Railway, on which there are two each way.

NEW PUBLICATIONS.

Sewage Disposal in the United States. By Geo. W. Rafter, M. Am. Soc. C. E., and M. N. Baker, Ph. B., Associate Editor *Engineering News.* New York: D. Van Nostrand Company; 1894. Large 8vo, pp. 598.

In preparing this volume the intention of the authors has been to "specifically call the attention of sanitary authorities, engineers and others interested in questions of public sanitation to the fact that we have already accumulated a considerable stock of experience in sewage disposal in this country."

But they have done a great deal more than this, for they have devoted 350 pages, a little more than half of the book, to a very full and thorough "discussion of principles," which includes copious extracts from and references to foreign reports and monographs on the subject of the pollution of streams, the causation of disease, and the purification of sewage, as well as the discussions on the same subjects which have appeared in our own country. The classification of the principles involved is logical, the analysis thorough, and, what is especially to be recommended, the authorities for the several statements are either quoted verbatim or specificially referred to so that they can be consulted in a library.

The second portion of the book, covering about 250 pages, is devoted to descriptions of about 50 different works for the disposal of sewage which have been constructed in the United States and Canada, illustrated with plans of many of them. These descriptions are quite full, and will doubtless prove of great value to engineers, more from their furnishing warnings of what to avoid in designing a system of sewage purification than from their affording examples for imitation. Carefully studied, the lessons they may teach the engineer who is capable of analyzing them cannot but be most instructive. To the amateur, who may desire to learn from their perusal how to dispose of the sewage of his particular house or institution or town, they will prove only confusing. That is only saying, however, that reading this book alone will not make any man an expert; but, on the other hand, no man, be he experienced or not, can afford to be without it in undertaking the design of works for sewage disposal. To have such a book, systematically put together and well indexed as this is, at hand will save even the best equipped "expert" an enormous waste of time and energy. The authors and the publisher have, moreover, shown good sense in getting up the book in convenient size for use, instead of the unwieldy large quarto form in which some textbooks are published.

Sanitary Improvements for the Port of Santos, Brazil. By E. A. Fuertes, assisted by Rudolph Hering and J. H. Fuertes, Consulting Engineers. Ithaca: Andrus & Church, Printers, 1894. Pages 152, 9½ × 12 in.

This is a voluminous report, made by Prof. E. A. Fuertes, of the Cornell University, who is under contract with the the government of the Province of Sao Paulo to devise plans for the drainage and sewage of the city of Santos. The publication comprises five documents, as follows: A Descriptive Memoir, The Plans, The Specifications, The Estimates, and Sundry Appendices. It contains a letter of transmittal; general considerations in which are discussed the conditions attending the sewerage of the city; statistics showing the death rate of Santos for years back and of the causes of the same and the losses resulting; an investigation of the effects of good sewerage and sanitation in other cities on various diseases; a review of the geological and topographical features of the country, the climate, the population, the present sanitary conditions of the city, the effect of quarantine, and the means to be employed for disinfection, the sanitation of dwellings, the provisions for a water supply, the plans and system recommended for sewerage and drainage, the disposal of garbage, and street paving and cleaning. A contract form is given together with forms for surety bonds and full and complete specifications for the sewers, the quarantine station, water works, drainage and paving; also proposed building regulations and arrangements for the removal of garbage, cleaning and sprinkling of streets and forms of proposals. The report makes a very comprehensive volume, and shows a great deal of study and preparation. Professor Fuertes has evidently made good use of his recent trip abroad in the study of European systems of sewerage, street paving and general sanitation of cities. The book is one that every sanitary engineer should possess, and it is to be hoped that copies will be put on sale. There may be some question as to the use of the contract and specification forms in Brazil, whose laws are based upon the civil law. The plans comprise a general map of the city and harbor, maps and plans for quarantine, plans of habitations, plans for water supply, sewerage, drainage, garbage disposal, and numerous diagrams showing graphically the rainfall, tides, shipping and death rates. The work is a very valuable contribution to sanitary science.

Currents of the Great Lakes. By Mark W. Harrington, Chief of the Weather Bureau, U. S. Department of Agriculture. Washington, 1894.

This publication consists of six charts or maps and six pages of text, showing and describing the currents of the Great Lakes as deduced from the movements of bottles during the seasons of 1892 and 1893. The text describes the bottles and apparatus employed to determine the currents, their directions and velocity. Several paragraphs are given to discussing of the direct and return currents, the velocities and the other features which the experiments have brought out. Each lake is also taken up and the peculiarities of the currents in each are described and dwelt upon.

TRADE CATALOGUES.

Holidays in England.—A very handsome guidebook has been issued under this title by the Great Eastern Railway of England. For advertising purposes this road is "The Cathedral Route," and the English passenger agent has hit upon a dignified and attractive name. The full title of the little volume is: Holidays in England, by the Cathedral Cities, the Tennyson and Dickens Country, and the Homes of the Pilgrim Fathers. The text of the volume is by Mr. Percy Lindley, known as the writer of a number of popular books of travel. The account of the towns and cities reached by the lines of the company gives an opportunity to describe briefly a beautiful country, rich in historic interest, with many "show" places, and of particular interest to Americans. Mr. Lindley's commentary is well written and entertaining. The illustrations are many and are generally very good. They give full-page views of Ely and Lincoln and other cathedrals; and smaller pictures of historic houses are scattered through the book.

H. W. Johns Manufacturing Co. has just issued a neat price list describing and illustrating its various products in paints and colors, roofing and building materials, non-conducting coverings, steam packings, fireproof cements, asbestos, fabrics, tubes, blocks and other special applications of this material. The contents of this catalogue are likely to prove a revelation even to those fairly well posted on the properties and possibilities of asbestos. The catalogue is profusely but neatly illustrated with half-tone cuts, and is well printed.

Master Mechanics' Association Scholarships.

There will be two scholarships vacant at Stevens Institute of Technology in September next. Sons of members and of deceased members only are eligible. Those desiring particulars of the entering examination will receive the same by applying to Angus Sinclair, Secretary, 5 Beekman street, New York.

Railroad Matters in Chicago.

Freight Traffic.—If the aggregate of freight handled at Chicago the past week by the Western railroads terminating here was an evidence of their general traffic, there was little change from that of the preceding week. The comparison with the second week in April in 1893 was also favorable.

The chief roads traversing the West and Northwest are maintaining their recent liberal volume of outbound merchandise and miscellaneous freight from Chicago, and the Burlington, St. Paul and Northwestern secured an increase. The gain was mainly due to the fact that trade in the Northwest was recently checked by adverse weather, and shipments of freight are now being made which would have gone out a fortnight since had the weather been favorable. The revival of work in the iron mining districts traversed by the Chicago & Northwestern and St. Paul systems is also giving those lines an increased traffic in that direction. The interior lumber trade between the mills in Minnesota and Wisconsin, and the states west of the Mississippi, although still below the average in mid-spring in recent years, is showing more energy than at any time in months.

Kansas Freight Rates.—The managers of Chicago railroads having lines traversing Kansas, when asked what action they will take in case the Railroad Commissioners of that state demand a reduction on current rates of freight, state that they will seek protection from the Federal Courts, basing their objection on the fact that the rates are already as low as can be made without an entire destruction of profits. Were it not for the expenses and trouble attending the litigation, they would not be averse to having the question submitted to the courts, as they are constantly annoyed by the threats of suits from Kansas shippers. These suits are encouraged by state officials, who seem to believe that capital invested in a railroad is a proper subject for confiscation. A well-known railroad man says: "The trouble with Kansas is that it has too much legislation for the regulation of railroad charges and too many short crops."

The deliveries of grain (bushels) at Chicago by the leading Western railroads for the week ending April 14, and the corresponding time the two preceding years, compare as follows:

	1894.	1893.	1892.
C. & N. West	463,000	424,000	259,000
Ill. Cent	225,000	403,000	444,000
C., R. I. & P.	293,009	31,000	343,000
C., B. & Q.	217,000	1,262,000	592,000
C. & Alton	97,000	33,000	110.000
C. & E. Ill.	21,060	75,000	77,000
C., M. & St. P.	372,000	340,000	380,000
Wabash	281,000	30,000	62,000
C. & G. W.	74,000	185,000	97,000
A., T. & S. Fe	54,000	122,000	148,000
L., N. A & C.	17,000		
Totals	2,114,000	2,905,000	2,512,000

The following shows the deliveries of flour (barrels) at Chicago by the leading Western railroads for the week ending April 14, and for the corresponding time the two preceding years:

	1894.	1893.	1892.
C. & N. West	17,761	21,447	24,061
Ill. Cent	150	2,275	1,605
C., R. I. & P.	9,188	1,800	6,000
C., B. & Quincy	10,595	14,442	14,235
C. & Alton	2,700	1,250	900
C. & E. Ill.	600	150	
C., M. & St. P.	26,650	25,200	24,445
Wabash		900	1,125
C. & G. W	23,666	11,136	16,650
A., T. & S. Fe		450	50
L., N. A. & C.			
Totals	91,310	79,050	89,071

The deliveries (carloads) of grain at Chicago by the Western railroads for the month of March and the corresponding time the three preceding years compare as follows:

	1894.	1893.	1892.	1891.
A., T. & S. Fe	772	1,399	1,432	747
C. & Alton	458	363	542	810
C., B. & Q.	2,459	2,514	3,002	1,913
C. & E. Ill.	182	389	320	272
C., M. & St. P.	2,348	2,072	2,911	2,262
C. & N. W.	2,882	1,855	2,821	2,311
C., R. I. & P.	1,551	748	2,058	1,476
C. & G. W.	501	1,221	875	514
Ill. Cent.	2,020	1,414	2,348	2,281
Wabash	726	295	362	577
Wis. Cent.	45	38	36	43
Other roads	1,138	2,676	3,132	1,910
Total	15,082	14,984	19,839	15,146

It will be seen by the above that the Chicago, Rock Island Pacific, Northwestern, St. Paul and Illinois Central made good gains this year over 1893, while the Burlington, Wabash and Santa Fe lost.

Passenger Traffic.—Although the majority of the Western group from Chicago report their passenger traffic as far below this period last year, they, with scarcely an exception, state that it is better than at any preceding time the current one. But railroad officers are confronted with the fact that the period is rapidly approaching when the comparisons of earnings with last year will show a still larger decrease.

CHICAGO, April 16.

Classification of Railroad Expenses in Reports to the Government.

The Interstate Commerce Commission has revised its Rules for the Classification of Operating Expenses, and the principal changes are indicated in a circular issued with the new rules by Prof. Henry C. Adams, the statistican:

WASHINGTON, Feb. 12, 1894.

To Carriers:

This classification of operating expenses, revised with the co-operation of a committee appointed by the Executive Committee of the Association of American Railway Accounting Officers, and issued upon the authority of the Interstate Commerce Commission, should be followed in the distribution of operating expenses in the Annual Report to the Commission for the year beginning July 1, 1894, and for subsequent years. No change has been made in the general theory of classification adopted by the convention of State Railroad Commissioners held at Saratoga, June, 1879, the division of general accounts being the division authorized by that convention, viz.:

Maintenance of Way and Structures.
Maintenance of Equipment.
Conducting Transportation.
General Expenses.

These general accounts are divided into 53 subaccounts, and while it is essential that the prescribed classification be maintained, carriers are of course at liberty to further divide any sub-account to meet peculiar conditions of business or to furnish its management with more detailed information.

The most important change in this revised classification consists in the abandonment of the assignment of expenses between passenger traffic and freight traffic, a change which for a long time had been urged by accountants, and which secured the approval of the State Railroad Commissioners at their fifth annual convention, held in Washington, April, 1893.

It will be observed also by comparing the revised classification with the classification previously issued, that a few changes have been made in subaccounts. An account entitled "Stationery and Printing" has been inserted in the general accounts, Maintenance of Way and Structures, Maintenance of Equipment and Conducting Transportation; all expenditures on account of stationery and printing having been previously included in a single account under General Expenses. Two new accounts entitled "Superintendence" have been raised, one under Maintenance of Equipment, and one under Conducting Transportation; the expense of superintendence in connection with Maintenance of Way and Structures being distributed among the several subaccounts. Five other new accounts have been raised, which will doubtless meet the approval of accounting officers, because they call for separate statements of congruous and significant items of expense. They are: "Repairs and Renewals of Work Cars," "Oil, Tallow, and Waste for Locomotives," "Hire of Equipment," "Clearing Wrecks," and "Rents for Tracks, Yards and Terminals."

The old accounts entitled "Expense of Fast-Freight Lines," "Expense of Traffic Associations," "Agencies, including Salaries and Rent," have been consolidated and together form a new account, which, under the name of "Outside Agencies," has been transferred from General Expenses to Conducting Transportation. The accounts entitled "Advertising," "Commissions" and "Rents of Buildings and Other Property" have been transferred from General Expenses to Conducting Transportation.

The classification of operating expenses herewith presented has been nearly four years in process of revision. Every accounting officer of an operating road, as also all state railroad commissioners, have been asked for criticisms and suggestions, and there is hardly an important railway line in the country which has not been represented, either directly or indirectly, on some one of the various committees having this matter in charge. It is needless to say that some of the changes finally agreed upon do not meet the approval of all the members of all the committees; but the statement may be made without fear of contradiction that this revised classification represents the best thought of the railway commissioners and the railway accounting officers of the United States, and that all who have interested themselves in its revision stand ready to give it cordial support. It is hoped, indeed it is expected, that the publication of this classification will be made the occasion of a change in the methods of accounting by those railways which have not yet adjusted their accounts to the general principles of classification to which it conforms. This the railways can do with confidence since there is no reason to expect another revision of the classification of operating expenses for a considerable number of years.

TECHNICAL.

Manufacturing and Business.

The Railroad Wrecking & Salvage Company, of Chicago, has been incorporated by F. Formaneck, Joseph Kral and Samuel L. Winternitz.

Ground has been broken on Fifty-seventh street, Pittsburgh, for McConway & Torley's new machine shops. They will be completed by July 1.

The Chicago Pneumatic Railway Gate Company, of Chicago, has been incorporated by George H. Clark, Paul Schwarzlose and Frank A. O'Donnell.

The McNeal Pipe & Foundry Co., of Burlington, N. J., has placed the contract for two cleaning sheds with the Berlin Iron Bridge Co., of East Berlin, Conn.

The United States Treasury Department has lately placed an order with the Pantasote Leather Co., of New York, for a quantity of Pantasote to be used for furniture covering, etc.

The Brown Coupler Co. has been organized in New Jersey with principal office at Bayonne, N. J. The officers chosen are: Emmett Smith, President; J. Hoyt Brown, Vice-President; Floyd K. Smith, Secretary; H. Burton Strait, Treasurer. The company controls the improved Brown emergency link coupler.

J. A. Fay & Co., of Cincinnati, O., report a large order for woodworking machinery from Havana, Cuba. The order is for machinery for furniture making, wagon and car building, and for a planing mill, and it will take nearly three months to execute it. This firm has received a good many foreign orders recently, but this from Havana is the largest of any.

The shops of the B. E. Tilden Co., of Chicago, manufacturers of railroad replacing frogs, were entirely burned on April 9. The firm still has a supply of wrecking frogs and motor replaces at other points which can be supplied without delay. The firm will make temporary arrangements for meeting orders for its specialties until the shops can be rebuilt.

The Lidgerwood Manufacturing Co., 96 Liberty street, New York, report the sale during the last month of 12 Locke-Miller cableways, aggregating about $90,000, and the company reports a large business in cableways. Contractors find that, where building materials have to be distributed over a considerable area, the hoisting and conveying are easily and economically effected by the use of the cableway.

The Cleveland Twist Drill Co. reports that the sale of its grip sockets for drills illustrated in last week's *Railroad Gazette* already exceeds the present facilities for their manufacture. The company has just furnished the United States Government for its Washington Navy Yard 6 of each size from No. 1 to No. 5 inclusive, making 30 sockets in all. An order from the United States Government is an event which all manufacturers appreciate.

At the annual meeting of the stockholders of the Jones Vestibule Sleeping Car Co. held in Denver, April 9, the following were elected directors for the ensuing year: H. A. W. Tabor, C. E. Anthony, S. H. Dent, H. M. Jones, W. H. McCloud, A. J. O'Brien, L. F. Kimball, Jas. H. Thomas, C. S. Lee, G. L. Hodges, H. Steegman, C. D. Wood and Marcus Finch. H. A. W. Tabor was elected President; H. M. Jones, Vice-President and General Manager; L. F. Kimball, Treasurer; George L. Hodges, General Counsel, and Marcus Finch, Secretary.

The Brooks Locomotive Works, which it was expected would close down last week, has received orders for four engines, which will keep the shops running in a small way for a little while. Only about 200 men are being employed, about 1,200 men who generally find work at the shops being unemployed. The car shops and all departments of the Carlisle Manufacturing Co., at Carlisle, Pa., closed down last week. The Lebanon Manufacturing Co. discharged about 200 men from its shops last week. A few small orders are on hand which will give emyloyment to a reduced force.

New Stations and Shops.

The Louisville, Evansville & St. Louis Consolidated is to build a new passenger station in East St. Louis, which, it is expected, will cost about $40,000.

The Delaware, Lackawanna & Western has placed the order for two engine-house roofs with the Berlin Iron Bridge Co., of East Berlin, Conn. Both roofs will be covered with that company's patent anti-condensation corrugated iron.

The citizens of Oelwein, Ia., have agreed to build a repair shop plant costing $200,000 for the Chicago Great Western, and the company has decided to accept the proposition and remove its shops to that point. Since the Minnesota & Northwestern was consolidated with the "Diagonal," the shops at South Park, Minn., have been inadequate, besides being located at a point inconvenient to the greater part of the line. The new location is an excellent one, and will save a great deal of hauling of crippled engines and cars.

Iron and Steel.

A dispatch from Knoxville, Tenn., states that the Watts Steel and Iron Works, at Middlesborough, Ky., will start up within 60 days and give employment to 600 men.

The Birmingham Iron Works were sold at Birmingham, Ala., on April 16, to R. M. Walmsley, President of the Louisiana National Bank of New Orleans, as trustee for the bondholders, for $50,000. The plant consists of mammoth machine and foundry works. It will start up on orders already booked.

Auxilliary Storage Batteries in Traction.

The city of Zurich, in Switzerland, has an electric street railroad of the trolley type in which an auxilliary storage battery equipment plays a prominent part. The road is a small one—scarcely three miles long—and there are altogether only nine cars in service. With a line so limited in extent the demand for current is subject to very wide fluctuations, and the load on the engines in the power station may rapidly vary from almost nothing up to the full maximum, giving rise to the most unfavorable conditions so far as economy of engine operation is concerned. With the aid of the storage battery plant, however, this is entirely avoided and a practically constant load is put on the engines.

Reorganization of the Pennsylvania Steel Co.

A new plan for the reorganization of the Pennsylvania Steel Co. and the Maryland Steel Co. was announced last week by the committees representing the creditors and the stockholders. The floating debt of the two companies is held chiefly in Philadelphia and Baltimore, and most of it is due this week.

About $6,300,000 is required to pay off these claims and the creditors are offered 40 per cent. in cash; 60 per cent. in consolidated mortgage bonds, bearing interest at six per cent. The consolidated mortgage will be

made for about $6,500,000, of which $3,000,000 will be reserved to take up the first mortgage and the balance used to settle the 60 per cent. due the creditors. The other features of the plan provide that the creditors are to receive 15 per cent. upon their claims in common stock, which is to be supplied from stock to be relinquished by present stockholders; $1,500,000 of seven per cent preferred stock, non-accumulative, to be subscribed for and taken at par by present stockholders, to provide new cash capital in the business; all debts under $1,000 to be paid in full; the interest on the consolidated mortgage bonds for the first three years, if not earned, is to be paid in scrip.

The plan formulated during the summer for the reorganization of the companies failed of adoption. It is believed that there is a better chance that the present plan will relieve the company of its embarrassment. Some of the stockholders, however, have announced their opposition to the terms of the plan. They object to the creditors receiving 15 per cent. in stock in addition to 40 per cent. in cash and 60 per cent. in bonds. They claim that there is no urgent necessity for reorganizing the properties at present; that the $300,000 guarantee fund promised by the so-called steel rail makers' combination is sufficient to protect the floating debt interest. They believe also that the condition of the iron and steel market will get no worse; that any change made will be for the better, and, therefore, reorganization should be postponed.

Performance of Engine 870.

Mechanical officers who are aiming at perfection will be glad to compare the records of their engines with the following memorandum of the work done in a year by the well-known "870" of the New York Central & Hudson River road. This engine runs from New York to Albany, 143 miles, and return, daily, each way without a stop. On the northbound trip it has four or five cars and the time is 2 h. 45 min., or 53.8 miles an hour; on the return the train is heavier and the time slower.

"Performance of Engine 870 running on the Empire State Express train, north, and the South Western Limited train, south.—Engine came out of the shop March 26, 1893, and went into the shop on April 2, 1894, being out of the shop 370 days and idle 10 days, so that in this continuous service the engine worked 360 days, making 360 round trips between New York and Albany, equal to a mileage during that period of 106,866 miles. There were two failures, viz.: April 5, 1893, broken follower bolt, lost 10 min.; Feb. 6, 1894, whistle broken, lost 30 min.—making total time lost by reason of engine failures, 40 min. The time lost from causes other than engine failures was 21 h. 57 min.; time made up exceeding schedule time 39 h. 51 min.; and the total time made up over and above schedule time and time lost, 17 h. 14 min."

The Kinsman Block System.

The installation of the Kinsman block system on the Evanston Division of the Chicago, Milwaukee & St. Paul is now completed and in operation. Probably the reader who is interested in this subject will remember that an experimental equipment has been in use there for something like a year. The installation for the regular working of trains was put in operation on the 9th, and within the first week was subjected to a severe rainstorm of 48 hours' duration, through which it is said to have functioned with no interruption.

Codey-Martin Car Heating Patents.

On the 10th of this month District Judge Henry H Swan, of the United States Circuit Court for the Eastern District of Michigan, rendered a decision in the suit of the Consolidated Car Heating Co., of Albany, against the Michigan Central Railroad Co. The Michigan Central was the nominal defendant, but the actual defendant is the Martin Anti-Fire Car Heater Co., of Dunkirk, N. Y., which company assumed the defense of the suit. The suit was on the priority of the patents of Codey and Martin, the Codey patent of 1885 being owned by the Consolidated company. The complaint was of infringement of this patent by the Martin system, with which certain cars of the Michigan Central were equipped. The judge's decision is that the Codey patent, No. 329,017, of Oct. 27, 1885, is a valid one and is owned by the Consolidated company, also that the Martin apparatus infringes this patent. The judge enjoins the Michigan Central from making, using or selling any car heating system or apparatus such as is covered by this patent, particularly any form of continuous car heating apparatus employing or taking steam from the locomotive through a continuous train pipe, in combination with the upper and lower courses of side coils within the cars, with intermediate connections near the center of the car between the upper courses of the said side coils and the supply pipe; and with an automatic steam trap under the central portion of the car, and intermediate connections between the lower courses of the side coils and said trap. The court orders an accounting of the damages and profits, and appoints Walter S. Harsha Special Master to take an accounting and report to the court.

Petroleum Fuel for Tugboats.

The Smoke Inspector of Chicago is about to make an experiment with petroleum as a fuel on tugboats plying in the river. He has secured the agreement of one company to fit out a tug with oil burners which will be done at once. An argument in favor of the adoption of petroleum by the tugmen is that if it is once thoroughly demonstrated that a boat can be run without smoke no boat making smoke will be allowed to enter the river. The big lake steamers will not adopt petroleum as a matter of course; and as they will not be allowed to enter the river under their own steam if they make smoke, the tugs will get extra tows. This argument is doing much toward a favorable consideration of the change by tugowners.

The Purdue Laboratory.

The reconstruction of the engineering laboratory at Purdue University has been quite rapid and very satisfactory to those in charge. Matters are fast taking a definite shape, and it is expected that in two months experimental works can be reumed.

THE SCRAP HEAP.

Notes.

It is announced that the Grand Trunk will reduce the pay of all employees 10 per cent.

The restoration of wages on the Union Pacific was approved by Judge Dundy on April 14. He decided that it should take effect as from March 1.

The Central of Georgia has recently supplied surgeons' outfits to its conductors, and the chief surgeon, in giving them out, instructed the conductors by means of object lessons in the art of bandaging broken limbs and the proper method of using the implements provided.

Judge Riner, in the United States District Court at Cheyenne, Wy., has issued an order that where garnishee process is served on the Receivers of the Union Pacific in a case against an employee, the same shall be disregarded by the Receivers, and no money paid out under it.

The Brotherhood officers have appealed from the decision of Judge Jenkins in the strike order case at Milwaukee. The original injunction against striking was slightly modified by Judge Jenkins, as reported in the *Railroad Gazette* last week, but the Brotherhood men evidently think that the modification did not go far enough, and they now appeal to the Circuit Court of Appeals to have the whole of the order, as far as it concerns them, vacated.

An injunction has been asked against the city of Philadelphia to prevent the appropriation of $6,000,000 by the city for depressing the grade of the tracks of the Philadelphia & Reading in that city, as agreed upon by the officers of the city and the receivers of the road. The city solicitors make answer that the law authorizing this $6,000,000 loan is not unconstitutional, as is claimed. On the same day the representatives of the city, acting as trustees for the Girard estate, appeared in the same court to present a case *against* the proposed loan.

Lake Notes.

In addition to fitting up its two large passenger ships for emigrant business the Northern Steamship Co. is putting emigrant accommodations into two of its six freight ships. The company has in contemplation a very large emigrant traffic, these four vessels giving it a capacity for handling about 1,000 emigrants weekly between Buffalo and Duluth. The Northern Queen, the first boat of the freight fleet to clear for the head of the lakes, is taking up about 75 emigrants.

The Northwest, the first of the company's passenger ships, will early in May give a series of free excursions at Buffalo, Cleveland, Detroit, Chicago and Duluth. She will start from Buffalo on her first regular trip June 5, arriving at Duluth, 1,000 miles, early on June 8.

The lake freight situation is exceedingly dull, worse than for years. Few if any grain charters are being made either at Chicago or Duluth. Ore tonnage is begging, while coal is not wanted. Lumber, too, which was expected to make a good showing, is very dull. In connection with this it is stated that the American Steel Barge Co. will build no more whaleback ships for a long time. Other yards on the lakes will do little this year.

Work has begun at all the iron ore shipping ports of the Lake Superior region. At Escanaba, the one ore port on Lake Michigan, has shipped considerable Gogebic ore, which would have gone via Ashland but for a strike of dockmen against a reduction from $1.75 to $1.25 a day. Very little Menominee ore will be handled this year at Escanaba. At Marquette considerable ore is going into pockets and boats are loading this week. Shipments from Marquette will probably be as large as last year, 1,000,000 tons. At Ashland there is a cessation of work because of the strike. The railroads have cut the ore tariff to 32 cents and must get it handled cheaper. At Two Harbors 10 trains are in the ore traffic over the Duluth & Iron Range road and several cargoes have been loaded already. Shipments for the year will be the greatest in the history of the port. Already over 1,200,000 tons have been sold to go from there. At Duluth the Missabe dock is being completed, 184 pockets or 33,000 tons being added to its capacity. Ore hauling begins next week and the road will probably carry 1,500,000 tons as against 600,000 last year.

Where Pennsylvania Railroad Stock is Owned.

About 46 per cent. of the capital stock of the Pennsylvania Railroad Company is now held abroad, whereas less than five years ago fully 50 per cent. was owned in London and on the continent. The loss of only four per cent. in the amount of foreign holdings is therefore significant, indicating, as it does, an almost complete confidence in the property and its management. Foreign investors, as is well known, have been liquidating their holdings of our securities for the past three or four years, and it is evident from this that the selling was in stocks other than the Pennsylvania. And the stock is now, generally, more widely scattered than at any time in its history, the number of stockholders at the time of the last election having been about 28,000, a gain of about 2,000 from a year ago.—*Wall Street News.*

Blast Furnace Capacity on April 1.

Returns of the furnaces in blast on the first of this month show a continued increase in capacity, the figures being 132,383 tons, as compared with 115,069 tons on March 1, an increase of over 15 per cent. This is 55,049 tons more than the furnace capacity of the country on the first of October last. The aggregate capacity of the furnaces in blast on the first of each month, back to 1891, is given below:

	1891.	1892.	1893.	1894.
January	163,281	191,442	175,701	102,999
February	139,359	193,007	173,385	108,321
March	120,715	193,827	177,210	115,069
April	113,316	188,109	162,169	132,383
May	116,586	175,343	186,982	.....
June	147,799	172,890	177,407	.....
July	167,424	169,850	160,952	.....
August	174,502	158,581	115,926	.....
September	174,506	156,194	83,481	.....
October	181,818	161,558	77,324	.....
November	192,743	173,925	84,635	.....
December	193,009	175,111	98,089	.....
Total	8,279,870	9,157,600	7,124,502	.....

The return for the first of this month completed the first quarter of this year, and allows us to compare the approximate outputs for the first quarter of each year since and including 1888, as below:

1888	1,602,961	1892	2,498,841
1889	1,759,922	1893	2,270,440
1890	2,275,949	1894	1,462,960
1891	1,706,575		

As noted above our furnace capacity has increased with each month since October until it is now 71 per cent. greater than then. This increase, however, has been made in the face of a nearly steady decline in price for about all items. Wire rods, which are now held at $25.80, as compared with $23.50 Feb. 1 and $26.12 in October, are an exception in consequence of a spurt in the demand for fencing material, but everything else in iron seems to be lower than when the improvement commenced.

A Committee Without a Grievance.

The Grievance Committee of the Brotherhood of Locomotive Engineers, of the Erie lines, held its regular biennial session in Cleveland, April 11. Fifteen members were present. The meeting was devoted to ordinary routine matters. M. H. Shay, of Youngstown, was re elected Chairman, and M. F. Fritz, of Port Jervis Secretary. "There was little to do," said one of the men, "and the time was largely spent in a social way. We haven't a grievance in the world and everything is absolutely lovely. The officers over us are the best in the world, and we have no fault to find in any manner whatsoever."—*Exchange.*

An Italian Royal Train.

The Italian Mediterranean Railroad Co. has built a vestibuled train of five coaches and two baggage cars for royalty to journey in. Four of the coaches have two 4-wheel bogies each, while the fifth has three axles on the Berg system. A transverse displacement of the middle axle causes the end axles to place themselves radially. Of the coaches there is one for the king, one for the queen and one for the crown prince, each of which contains a drawing-room, sleeping compartment and a toilet-room, besides accommodations for the suite. The other cars are a dining car and a kitchen. The train is equipped with continuous automatic vacuum brakes. The total dead weights are:

2 baggage cars of 23,100 lbs. each				46,200 lbs.
2 52½ ft.	"	"	62,700 " "	125,400 "
2 53½ "	"	"	65,100 " "	130,200 "
1 6 wheel car				44,000 "
Total				345,800 lbs.

The weights had to be kept inside of 160 tons to permit fast running on the steep mountain grades.

The Puddled Iron Trade of Great Britain.

The puddled iron produced in Great Britain during 1893 was 1,363,974 tons, as against 1,560,697 tons in 1892, and 2,253,756 tons in 1889, which was the year of greatest production since 1882, when the amount reached 2,841,534 tons. Since 1889 the fall in production has been continuous, and amounts to 849.782 tons, or nearly 40 per cent. Mr. J. S. Jeans has from time to time called attention to the disuse of puddled iron, with consequent destruction of capital invested in puddling furnaces, etc., and loss of labor at the furnaces and mills. This loss has in part been made up by the increase in the output of open hearth steel and the employment given by shipbuilding. The main items of British iron production at the present time and 12 years ago are given below (1 = 1,000 tons).

	1882.	1893.	Increase or decrease per cent.
Pig iron	8,493	6,830	— 19.6
Puddled iron	2,841	1,364	— 51.9
Bessemer ingots	1,673	1,493	— 10.8
Open hearth ingots	436	1,400	+221.1
Total converted iron	4,950	4,257	— 14.0

Great Britain's largest output of pig iron was in 1882, though in 1889 its production was nearly as large.

The production of Bessemer ingots in Great Britain was at its maximum, 2,140,791 tons, in 1889. Its largest make of rails, however, was in 1882, when it produced 1,235,785 tons of rails from 1,673,649 tons of ingots, i. e., about 74 per cent. of the Bessemer product went into rails that year as against 579,386 tons out of 1,493,454, or less than 39 per cent., for last year.

Comity Between Competing Carriers.

The following notice has been issued to agents on the Pennsylvania lines west of Pittsburgh and on the Vandalia road by General Baggage Agent R. R. Bentley. Baskets or crates containing homing pigeons may be forwarded without check, at owner's risk, by baggage car to any point desired on the above named lines, whether accompanied by passenger or not. They must be plainly addressed, and regular excess baggage charges will be collected. If unaccompanied by passenger you will telegraph agent at destination, if desired, to liberate the birds, and return empty basket free.

Both Sides Win.

A verdict has just been rendered in the United States Circuit Court sitting in Cleveland, O., in the suit of Fielding & Platt, of England, against the Morgan Engineering Company, of Alliance, O. The suit was brought to recover about $5,000 for machinery purchased, but a counter-claim was brought in for $20,000 on the part of the Alliance company. The jury allowed Fielding & Platt $5,292.54, but also allowed the Morgan Company $10,518.59, thus leaving $5,226.05 in favor of the latter company. The trial was one of the longest in the court for years.

Another Bridge Tunnel.

An interesting proposal to connect Europe and Asia Minor by a "bridge-tunnel," to consist of an iron tube of

large diameter resting on piers at a depth of about 40 ft. below the surface of the Bosphorus, and to have Constantinople and Scutari as its European and Asiatic terminals, respectively, is discussed in a recent number of the *Revue Technique* by M. F. de Villepique. The scheme is primarily designed to save grade in the approaches. The structure would be carried at a depth below the water level of a little over 40 ft., where the water would be practically free from agitation, and its total length would be about 2,500 meters, or in the neighborhood of 8,200 ft.

Fame.

"The poor and unlettered man who invented the cotton gin is a benefactor equally with the learned Dr. Watts, who first made steam a motive power.—*J. Sterling Morton at Boston.*"

Who was this learned Dr. Watts that made steam a motive power? Was he any relation of Sike Watts, the well-known Cuckoo poet of Dogweed Run? Mr. Morton ought to write a piece about the steam Dr. Watts. A penny weight of information, says the Persian gnomic poet, Eb-nah-din, is worth more than a pound of Government seeds.—*The Sun* (New York).

LOCOMOTIVE BUILDING.

The Florida Southern has ordered three 8-wheel passenger locomotives from the Brooks Locomotive Works.

CAR BUILDING.

The Savannah, Florida & Western is in the market for 10 passenger cars.

The Fitchburg Railroad is to build 100 cars at its own shops at Fitchburg, Mass.

The Newburg Street Railway Co., of Newburg, N. Y., is about to order eight passenger cars.

The Billmyer & Small Company, of York, Pa., are building 25 freight cars for the Cartagena Railroad, in Colombia, South America.

BRIDGE BUILDING.

Aitkin, Minn.—Business men of this city have guaranteed the payment of the outstanding county bonds and the county commissioners now agree to use the money in the sinking fund for the retirement of these bonds in the construction of a bridge across the Mississippi River at this place.

Baltimore, Md.—The City Council has passed ordinances: appropriating $4,000 for repairing Block street drawbridge and providing for a new steel bridge over Gwynn's Falls, on Columbia avenue; appropriation $27,000.

Bangor, Me.—The bridge across the Meduxnekeag, or the Bangor & Aroostook Railroad extension north of Houlton, will be long like the name, and is to be one of the finest bridge structures along this road.

Buxton, Me.—A special town meeting was held in Buxton, April 14, to take action in regard to building an iron bridge at West Buxton.

Cincinnati, O.—A bill introduced in the legislature authorizing this city to spend $15,000 in completing the Mitchell avenue bridge has passed the House and is now a law.

Covington, La.—The contract has been awarded to the Penn Bridge Co., of Houston, Tex., for the construction of a bridge over the Boguefalaya River, at Covington, La. The cost of the bridge will be $1,650.

Elmira, N. Y.—The New York, Lake Erie & Western has contracted with the Elmira Bridge Co. for a new iron bridge to supersede the present structure across the Chemung River in this city. The bridge will be built this summer.

Forestville, N. Y.—The Town Board met on April 7 and awarded the contracts for two iron bridges. Bids were received from the following companies: Owego Bridge Co , of Owego; Kellogg Iron Works, of Buffalo; Penn Bridge Co., of Beaver Falls, Pa.; Wrought-Iron Bridge Co., of Canton, O.; and the Groton Bridge Co., of New York. The contract for the Rider bridge was let to the Owego Bridge Co. for $700, and the contract for the Waterman bridge was let to the Groton Bridge Co. for $760.

Nicholson, Pa.—One steel bridge instead of two will be built over the Tunkhamock River at this point by the Delaware, Lackawanna & Western.

Norristown, Pa.—A new county bridge will be erected over a branch of the Neshaming River in Montgomery Township.

Philadelphia.—The Pennsylvania Railroad has let a contract for the construction of an iron overhead bridge across Highland avenue, near Wissahickon, on the Chestnut Hill branch.

Pittsburgh.—The County Commissioners have let the contracts for the iron superstructures of five bridges over Pine Creek, Bull Creek, Dog's Run, Thompson's Creek and Little Pine Creek to the Penn Bridge Co., of Beaver Falls, Pa., at $3,490.

Portland, Me.—The city authorities will ask the next legislature to grant permission to borrow $100,000 for rebuilding Tukey's bridge.

Rochester, Pa.—A party of capitalists, of Beaver County and Pittsburgh, have made an application for a charter for an iron highway bridge over the Ohio River from Rochester to Monaca. The bridge is to cost about $200,000.

Sayre, Pa.—Citizens of this place are discussing the project of bridging the Susquehanna River.

South St. Paul, Minn.—The town of Newport has voted $20,000 in bonds to aid in the constrtction of the combination railroad and wagon bridge to be built across the Mississippi River by the South St. Paul Belt Line Railway Co. South St. Paul had already voted $75,000, and the town of Cottage Grove will vote this week on the proposition to vote $5,000 in bonds, to aid the project.

Tacoma, Wash.—The contract for building the Eleventh Street bridge was finally awarded by the Board of Public Works to the King Bridge Co., of Cleveland, O., at its bid of $79,696.

Taylorville, Pa.—The County Commissioners have contracted with the Groton Bridge Co., of Groton, N. Y., for the erection of a bridge at this point. The bridge is to be 143 ft., and will cost $4,500. It is to be finished by June 15.

York, Pa.—The York County Commissioners will erect a new bridge across the Codorus River at Grantly street.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

Under the acts of Congress granting lands to Minnesota to aid in building railroads and the acts of the territorial and state legislatures granting such lands, the lands so granted were required to be selected from a territory coterminous with the railroad, and the Governor of Minnesota had authority to make deeds of land as fast as the roads were constructed. The Federal Court rules that such deeds conveying lands in advance of the point to which the road was actually constructed were not void, but only voidable.[1]

In a case in the Federal Court the contract under which cars were furnished to a railroad company styled itself a "lease," and provided for payment of the purchase money in monthly installments, with the right in the vendor, on default, to take possession of the cars, and sell, returning any surplus after payment of the outstanding notes to the vendee. The vendor put his name on the cars as owner, and recorded the contract as required in the case of conditional sales. The Court rules that the cars were "furnished," within the meaning of Code Va. § 2485, declaring a supply lien in such cases, and nothing done by the vendor herein amounted to a waiver of such lien.[2]

In the same case it is held that medical services rendered and board furnished by a hospital to an employee of a railroad company injured and disabled in its service are not "supplies necessary for the operation of a railroad," within the law giving a lien for supplies.[3]

A Michigan statute authorizes railroad companies to withhold payment to a contractor for construction work till persons furnishing materials and laborers thereon are paid, and makes it the duty of such companies to see that all laborers and furnishers of materials are paid before payment is made to the contractors, provided that a bill of items of the material and labor furnished shall be presented to the company, together with the amount claimed, prior to the usual pay day of said company, when such claims shall be due, or in case the contractor or contractors are not then paid, then prior to the payment then due. The Supreme Court holds that a railroad company may withhold payments for the protection of laborers and material men as against a garnishing creditor of the contractor, though no bill of items of material and labor has been furnished, as provided in the statute.[4]

Injuries to Passengers, Employees and Strangers.

In Texas it is held that where a carrier places on sale excursion tickets, good for a limited time at reduced rates over its own and connecting lines, to induce purchasers to visit a distant place for a specific purpose, a purchaser has a right to presume, without further inquiry, that the time limited is sufficient for the purpose.[5]

In the same state the Supreme Court rules that the rule that a person who is on a train of cars through courtesy of the railroad company cannot recover for injuries resulting from the negligence of its employees does not obtain in Texas.[6]

In Texas it is held that a provision in a contract of shipment of live stock that the shipper, to whom a shipper's pass on the same train was given, should feed and water the animals on the way, is not void as an attempt by the carrier to relieve itself of its duty in that respect, but is a license to the shipper to look after his stock; and he does not, by exercising such license, lose his status as a passenger, so as to preclude him from recovering for injuries, while so engaged, caused by the carrier's negligence.[7]

In Indiana it is held that the amount of damages for humiliation and shame laid upon a passenger by his wrongful ejection from a train is for the jury to determine, and a verdict for $500 will not be disturbed as excessive.[8]

In Mississippi the Supreme Court rules that a railroad is liable to a passenger for the refusal and failure of the conductor to furnish him with such a seat as he has paid for, when there are more of such seats than there are passengers, but there are none vacant, owing to the fact that some of the passengers occupy more seats than they are entitled to.[9]

In Texas it is held that where an intruder on a train of cars refuses to pay his fare on demand by the conductor, the latter is authorized to remove him and, after such removal has been begun, an offer to pay the sum demanded may be accepted or not, at the discretion of the conductor.[10]

In the Federal Court plaintiff, who was in charge of stock on a freight train, went forward, while the train had stopped, to examine his stock. The train started suddenly, and, finding that from its speed he could not board the caboose from the ground, he got upon the top of the train to walk back to the caboose, as it was customary for cattle men to do under the circumstances. He did not look toward the front of the train, and was struck by a bridge. The Court holds that evidence was admissible that it was customary for cattle men, under such circumstances, to walk on the top of the cars, and that the railroad company was aware of such custom, and acquiesced in it.[11]

In Alabama it is held that where a passenger in passing from the station to a train fell over lumber obstructing the platform in part, which he knew was on the platform, but had forgotten at the time he fell, he was guilty of contributory negligence.[12]

In Utah while decedent was riding to his work for defendant railroad company in a passenger car, placed, in violation of statute, in front of loaded freight cars, the train became derailed because of a defective switch, and the passenger coach was broken in two, crushed by the cars behind it and set on fire. Decedent, who had just stepped onto the platform of the car was thrown off and killed. Others in the car and on the platform were injured; some slightly, others seriously. The Supreme Court holds that an instruction that decedent was guilty of contributory negligence in standing on the platform was properly refused.[13]

In Oregon plaintiff was loading ties on a car. The usual method was by blocking them, as he knew. When the car was nearly loaded defendant's foreman told the men to hurry up and load them one on another. When the car was nearly filled the ties which were not blocked fell over on plaintiff. The Supreme Court rules that, if the risk was increased plaintiff knew of it, it being open to common observation, and assumed it.[14]

The Supreme Court of Virginia holds that where a locomotive engineer leaves his engine to the management of an inexperienced fireman while a flying switch is being made with such engine under the direction of the conductor, and a brakeman is killed by reason of the improper management of the engine by such fireman, the railroad company is guilty of negligence.[15]

In Florida the Supreme Court holds that an employer has performed its whole duty in respect to furnishing surgical aid to a servant injured while at work if it employs a person of ordinary skill in the profession; and, having done so, it is not liable for negligence on the part of the surgeon in the performance of his duties.[16]

In the Federal Court a railroad which had the right to run its trains into a certain town over the tracks of another company, then in the hands of receivers, duly notified the yardmaster of the latter at that place that an extra train would arrive about 10 A. M. on a certain day. The yardmaster communicated this intelligence to the foremen of the several switching engines, but the foreman of one engine neglected to notify his engineer; and the latter, while looking backward at the cars in his charge, ran his engine inio the extra, thereby killing a passenger. The court holds that the receivers were liable for the death, and this notwithstanding the fact that the extra was so late that, under the rules of the yard, the switch engine had a right to occupy the tracks.[17]

[1] St. Paul & N. P. v. St. Paul, M. & M., 57 Fed. Rep., 272.
[2] [3] Newgass v. Atlantic & D., 56 Fed. Rep., 676.
[4] Dawson v. Iron Range & H. B., 56 N. W. Rep., 106.
[5] T. & P. v. Dennis, 25 S. W. Rep., 400.
[6] Campbell v. Harris, 23 S. W. Rep., 35.
[7] Intl. & G. N. v. Armstrong, 23 S. W. Rep., 238.
[8] Lake Erie & W. v. Arnold, 34 N. E. Rep., 742.
[9] N. O. & T. v. Patterson, 13 South. Rep., 697.
[10] Gal., H. & S. A. v. Turner, 23 S. W. Rep., 83.
[11] C. M. & St. P. v. Carpenter, 56 Fed. Rep., 451.
[12] Wood v. R. & D., 13 South. Rep., 552.
[13] Woods v. S. P. Co., 33 Pac. Rep., 628.
[14] Brown v. Oregon L. Co. (Or.), 33 Pac. Rep., 557.
[15] N. & W. v. Thomas' Adm'r, 17 S. E. Rep., 884.
[16] So. Fla., v. Price, 13 South. Rep., 648.
[17] Eddy v. Letcher, 57 F. Fed. Rep., 115.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Long Island, quarterly, 1 per cent., payable May 1.
Nashville, Chattanooga & St. Louis, quarterly, 1¼ per cent., payable May 1.
Toledo & Ohio Central, quarterly, 1¼ per cent. on the preferred stock, payable April 25.
Wheeling & Lake Erie, quarterly, 1 per cent. on the preferred stock, pay able May 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 22.
Central of New Jersey, annual, Jersey City, N. J., May 11.
Cincinnati, Saginaw & Mackinaw, annual, Saginaw, Mich., April 17.
Dauphin & Berks, annual, Philadelphia, Pa., May 7.
Delaware & Hudson Canal, annual, New York City, May 8.
Dutchess County, annual, Poughkeepsie, N. Y., May 7.
Eastern of New Hampshire, annual, Portsmouth, N. H., May 1.
Elmira & Lake Ontario, annual, New York City, May 3.
Grand River Valley, Jackson, Mich., April 25.
Lake Shore & Michigan Southern, annual, Cleveland, O., May 2.
Michigan Central, annual, Detroit, Mich., May 3.
Missouri, Kansas & Texas, annual, Parsons, Kan., May 16.
New York, Chicago & St. Louis, annual, Cleveland, O., May 2.
Norfolk & Western, annual, Roanoke, Va., May 2.
Omaha & St. Louis, annual, Stanberry, Mo., May 15.
Philadelphia, Harrisburg & Pittsburgh, annual, Philadelphia, Pa., May 7.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 4.
Union Pacific, annual, Boston, Mass., April 25.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its annual convention at Saratoga, N. Y., beginning June 12. The hotel headquarters will be at Congress Hall, H. S. Clements, Manager.

The *Master Mechanics' Association* will hold its annual convention at Saratoga, N. Y., beginning June 18.

The *National Association of Local Freight Agents* will hold its annual convention at Pittsburgh, Pa., June 12, 13, 14. The headquarters will be at the Monongahela House.

The *Association of American Railway Accounting Officers* will hold its next annual meeting at Willard Hall, Washington, D. C., commencing May 30.

The *Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month at 8 p. m. The annual convention will be held at the Cataract House, Niagara Falls, N. Y., beginning June 20.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas Place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 7:30 p. m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo, on the second Monday in each month.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month at 8 p. m.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month.

The *Scandinavian Engineering Society of Chicago* meets in room 309, Title and Trust Building, 100 Washington street, on the third Thursday in each month.

The *Foundrymen's Association* meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

Convention of Railroad Employees in New York.

The Order of Railway Conductors will hold a convention at the Lenox Lyceum, New York City, on May 27, 28 and 29, to which the five other principal brotherhoods have been invited. The announcement bears the signatures of the chiefs of all these brotherhoods. The purpose of the convention is to see if a line of action can be agreed upon looking to legislation in favor of railroad employees. Each division or lodge throughout the country is requested to send as many members as possible.

Engineers' Club of St. Louis.

A meeting of the club was held April 11, 32 members and three visitors present. Messrs. Chas. Dwight Mitchell and W. George Brenneke were elected to membership. Applications for membership were announced from Guy Willis Latta, Engineer with Chas. W. Melcher Machinery Co., and Prof. Wm. Kendrick Hatt, Associate Professor Civil Engineering, Purdue University.

The paper of the evening was presented by Mr. J. A. Laird, Mechanical Engineer of the St. Louis water works extension, upon the "New Machinery Now Being Installed." Mr. Laird gave a general description of the four different types of pumping engines under contract, with cost of each. The main shaft of high-service engine No. 6 is of nickel-steel, 92,000 lbs. tensile strength and 22 per cent. elongation in four diameters. The capacity and duty tests on Chain of Rocks engines are to be for 720 consecutive hours. There is a 15-ton electric traveling crane in the engine-house at the Chain of Rocks; vertical hoist, 80 ft. It has not caused a moment's delay in nine months' use, and is looked after and run by an ordinary helper.

There are separate steam mains for each pair of engines. All feedwater will be metered. The running of the entire plant will be made as near as possible a perpetual duty trial. The specifications for the Baden 10,000,000-gall. engines call for 125,000,000 foot-pounds duty, and offer a bonus of $1,000 per million of duty developed above 125,000,000; and provide a forfeit of $2,500 per each million that the duty falls below 125,000,000. These engines are provided with pressure relief valves, capable of by-passing all water delivered back into suction. The Baden engine-house will be provided with a 20-ton electric traveling crane.

When the stations at Baden and Chain of Rocks are completed, the engines and boilers will be put on regular running watches, and will be overhauled at regular intervals. It is expected that the new machinery will be able to do the same work at half the cost of the present plants, and save on a 15,000,000-gall. high-service engine running two-thirds of the time $7,150 per year, which is five per cent. interest on $143,000.

The discussion was opened by Mr. Flad, and continued by Messrs. Seddon, Ferguson, and Professor Kinealy.

Air-Brake Inspectors.

The Association of Air-Brakemen held its convention at Columbus, Ohio, April 13. The following officers were elected: President, S. D. Hutchins, Columbus; Vice-Presidents, A. J. Cota, Aurora, Ill.; R. N. Martin, Renova, Pa.; M. E. Kee, St. Paul, Minn; Secretary, P. M. Kilroy, Pine Bluff, Ark.; Treasurer, Otto Best, Nashville, Tenn.; Executive Committee, J. L. Andrews, Hartford, Conn.; William C. Walsh, Evansville, Ind.; L. H. Brown, Covington, Ky. The next place of meeting was left to the Executive Committee.

Ticket Agents' Annual Convention.

The seventh annual convention of the International Association of Ticket Agents was held at Los Angeles, Cal., April 11. One hundred and sixty delegates were present. The election of officers resulted in the choice of the following: President, W. B Conard, Philadelphia; First Vice-President, W. H. Lohmiller; Second Vice-President, Charles C. Benson; Third Vice-President, Charles Van Camp; Secretary, C. G. Cadwallader, Philadelphia; Treasurer, T. W. Venemann, Evansville, Ind.

Master Mechanics' Convention.

The twenty-seventh annual convention will meet at Saratoga, N. Y., at 9 a. m., June 18. The headquarters of the Association will be in Congress Hall. Members and their friends who expect to attend should apply for rooms to Mr. H. S. Clements, Congress Hall, Saratoga, N. Y., without delay. The charge is $3 a day for each person.

Western Society of Engineers.

A meeting was held at the Grand Pacific Hotel, Chicago, April 4, 1894, 36 members and guests being present.

Mr. Charles J. Roney read a paper entitled, "Some Notes on the German Collective Exhibit of Engineering at the World's Columbian Exposition." The following is a brief abstract: The Royal Prussian Ministry of Public Works, of Berlin, made a very extensive exhibit of plans, drawings, photographs and publications of the regulation of the Prussian rivers, construction of canals and improvements of harbors, etc., together with several models of moveble river weirs. There was also exhibited a self-registering river and tide gage of the Seibt-Fuess system, invented by Professor Seibt, of Berlin, and constructed by R. Fuess, of Berlin. Mr. F. H. Schmidt, of Altona Rainweg, exhibited two colored drawings and a sheet iron model of his patent iron sheet piling with concrete filling, adopted for quay wall in Bremen, Vegesack and Cameroon. Messrs. Menck & Hambrock, Altona, Hamburgh, exhibited colored drawings of contractors' machinery for pier building at Santos Harbor, Brazil, consisting of steam pile drivers, a centrifugal pump for dredging mud, and a traveling crane for depositing concrete beton under water.

Mr. G. Luther, of Brunswick, exhibited drawings and photographs of machinery manufactured and works constructed by him. Among these were large duplex pumping engines, floating harbor cranes, the harbor installation of La Plata, Argentine Republic, etc; also large water color views and photographs of the improvement of the lower Danube, and colored drawings of the grain elevators of Galat zand Braila, on the Danube. He also exhibited drawings of a project for the improvement of the harbor of Odessa, Russia, the principal shipping point for the great grain-producing region of Southern Russia. The estimated cost of the entire plant is upward of $6,000,000. The writer expressed his warm appreciation of the entire German Engineering Exhibit; an exhibit which won the admiration alike of engineers, the press, and intelligent visitors generally, and which is to be again exhibited during the coming summer in Berlin.

The next meeting of the society will be held at the Grand Pacific Hotel, Chicago, at 8 P. M. on Wednesday, May 2. A paper on the "New Tunnel of the West Chicago Street Railway, near Van Buren Street," will be presented by Mr. Charles V. Weston. This tunnel will probably be opened for traffic this month. As it would be inconvenient to examine the tunnel after the cable cars begin running, the members of the society met on Saturday, April 14, and Mr. Weston conducted the visitors through the tunnel and explained methods of construction, etc.

Northwest Railroad Club.

At the April meeting, held at the Ryan Hotel in St. Paul on the 10th, E. A. Williams, Master Mechanic of the Minneapolis, St. Paul & Sault Ste. Marie, read an interesting paper on "The Care of Passenger Trains at Terminals." The second subject under discussion was "Compound Locomotives: Are Their Records in the Northwest Meeting Expectations?"

Engineering Association of the South.

The regular monthly meeting of the Association was held at Nashville, Tenn., on April 12.

The paper of the evening was presented by Dr. J. M. Safford, on the Phosphate Beds of Tennessee.

The phosphate beds of middle Tennessee are found west of the meridian of Nashville and east of the Tennessee River. Their geological horizon is very definite. They cover an immense territory, but are not everywhere worthy of consideration. In some places they are a mere trace a few inches thick; in others they run entirely into sand and stone. In some local regions it would appear that we have a bonanza. There are two distinct beds of the phosphate, one above the black shale and one below. The bed lying under the shale is most important. It resembles a bed of stone coal, both in appearance and the manner in which it will have to be mined. The black shale lying between the phosphate beds is found in all the counties, is highly impregnated with petroleum, and flames up when thrown into the fire like a brick soaked in coal oil. The thickness of this lower phosphate ranges from a few inches to 52 in., or to something more than 4 ft. good phosphate rock.

The available area is yet unknown. It has been found 52 in. thick on Swan Creek, in Hickman and Lewis counties. There is not the uncertainty about this phosphate that there is about the Florida phosphate. By careful examination of the outcrop accurate estimates of the tonnage can be made. A cubic yard will weigh about two tons. The estimated cost of mining per net ton is $1. The National Fertilizer Company, after a careful practical test, has pronounced it a most valvable find. Analyses show this phosphate to contain from 60 to 75 per cent. of bone phosphate.

Arrangements have been set on foot to hold the May meeting somewhere on the Muscle Shoals Canal. The party will meet at Decatur early on May 12. The trip will be made through the canal by steamer, returning to Decatur the same night.

PERSONALS.

—Mr. W. H. McDoel, General Manager of the Louisville, New Albany & Chicago, has been appointed Vice-President of this company.

—Mr. E. Ford, Superintendent of the South Bound Division of the Florida Central & Peninsular, has resigned that office, to take effect on May 1.

—Mr. Charles E. Fuller, Superintendent of Bridges and Buildings of the Terre Haute & Indianapolis Railroad, died at Terre Haute, Ind., April 11, aged 64 years.

—Mr. John C. Trautwine, Jr., of Philadelphia, Secretary of the Association of Engineering Societies, has removed his office from the Franklin Institute to 419 Locust street.

—Mr. David P. Corwin, Secretary and Treasurer of the Pittsburgh, Virginia & Charleston road since its organization in 1871, has resigned in order to devote his whole time to his private interests.

—Mr. Henry C. Payne, of Milwaukee, Receiver of the Chicago & Northern Pacific, has been elected President of the Northern Pacific and Chicago & Calumet Railroad companies as successor to David S. Wegg, resigned.

—Mr. Charles B. Kinnan, formerly Eastern Passenger Agent of the Northern Pacific in New York, has been made joint Secretary of the St. Paul and Minneapolis Passenger Associations with headquarters in Minneapolis.

—Mr. S. W. McMunn has been appointed Sales Agent of the Otis Steel Co. (Limited), with headquarters in Chicago, succeeding W. M. Wilson, resigned. Mr. McMunn was for a long time the representative of the Carnegie Steel Co.

—Mr. Robert A. Park, who recently retired from the service of the Pennsylvania Railroad Company, has again resumed his connection with the road as Passenger Agent for the southeastern district, with headquarters in Washington, D. C.

—Mr. W. E. Looney has resigned as Master Car Builder of the Louisville, Evansville & St. Louis and the office has been abolished. Mr. J. K. Lape, Superintendent of Motive Power, will have charge of the motive power and car departments.

—Mr. E. C. Bickel has resigned as General Manager of the Elkhart & Western, and Mr. H. E. Buckler, of Chicago, the President of the company, is now acting as Manager. Mr. Bickel was the chief projector of the railroad and most actively concerned in its construction.

—Mr. Leonard Goodwin, son of the late H. Stanley Goodwin, for many years General Eastern Superintendent of the Lehigh Valley Railroad, has been promoted to be Assistant Trainmaster of the Pennsylvania, Poughkeepsie & Boston Railroad, leased by the Lehigh Valley Mr. Goodwin was formerly connected with the Superintendent's office at Easton, Pa.

—Mr. F. W. Stone, Assistant General Freight Agent of the Philadelphia & Reading, has resigned and has been succeeded by Mr. John F. Auch, who has held the post of Division Freight Agent for the company at Harrisburg, Pa. Mr. George S. Costa, Freight Claim Agent, will succeed Mr. Auch as Division Freight Agent at Harrisburg, and will also act as General Eastern Agent of the Southern States Dispatch.

—Mr. S. F. B. Morse, General Eastern Agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Buffalo, has been appointed General Passenger and Ticket Agent of the Southern Pacific Co. (Atlantic Division), to succeed Mr. W. C. Watson, who resigned some months ago. Mr. Morse has represented the "Big Four" Company at Buffalo as General Eastern Agent since December. He was previously Division Passenger Agent of the Louisville & Nashville at Cincinnati. He had held that office since the Louisville & Nashville had leased the Kentucky Central, of which Mr. Morse was General Passenger Agent.

—Mr. Walter G. Oakman has been elected President of the New York Guaranty & Indemnity Co., of New York, one of the most important institutions of its kind in New York. Mr. Oakman is best known through his connection with railroads. He was Division Superintendent of the Delaware, Lackawanna & Western Railroad between 1878 to 1884 and then from 1884 to 1891, respectively, Third, Second and First Vice-President of the Richmond & Danville. In 1891 he was First Vice-President of the Central Railroad of New Jersey and resigned that position in the spring of 1892 to accept the Presidency of the Richmond & West Point Terminal Railway & Warehouse Co., and after the failure of the first plan for the reorganization of this company he was appointed Receiver in June, 1892.

—Col. George T. Balch, U. S. A., retired, died last Sunday morning, April 15, at his home in New York City. He was about 65 years of age, was a graduate of West Point and served for years in the Ordnance Corps of the Army. His principal connection with railroads was short, but rather remarkable. He was selected nearly 20 years ago, that is, during the receivership of Mr. Jewett, to make an inventory of the Erie property. This inventory is really quite monumental because of its arrangement and because of the completeness of details. Such synopses of it as were put into print were sought for by many railroad men, not so much as models for their own inventories as for the sake of the suggestions which they could get in the way of improving their own records and accounts. The inventory may now be seen in the general offices of the Erie, being 15 or 20 tall volumes of which there would probably have been 15 or 20 more had the Colonel been allowed to carry on his work. His scheme included not merely naming every individual object belonging to the company, but also specifying its actual present condition and its probabilities of life.

ELECTIONS AND APPOINTMENTS.

Altoona & Philipsburg Connecting.—George M. Case, of Philipsburg, has been appointed General Freight and Passenger Agent with headquarters in Philipsburg, Pa. He has been for several years Assistant Passenger Agent for the Beech Creek.

Baltimore & Ohio Southwestern.—E. E. Jenks, who has been connected with the engineering department of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed Master Mechanic of the Mississippi Division, to succeed C. S. Skinner, resigned.

Central Ontario.—George Collins, Secretary and Treasurer, has been appointed General Superintendent with headquarters at Trenton, Ont., vice J. D. Riddell, resigned. R. H. Spencer has been appointed Treasurer.

Central Pacific.—Isaac L. Requa was elected President and C. P. Huntington Vice-President at the meeting of the directors at San Francisco on April 12.

Cleveland, Cincinnati, Chicago & St. Louis.—H. M. Griggs, formerly General Southern Agent, has been appointed Assistant General Freight Agent of the Peoria and Eastern division, with headquarters at Peoria, Ill.

Lehigh Valley.—H. D. Taylor has been appointed Superintendent of Tests. Mr. Taylor was formerly connected with the New York, Pennsylvania & Ohio in the same capacity.

Little Rock, Hot Springs & Texas.—W. H. Hopkins has been appointed Purchasing Agent, with headquarters at St. Louis, Mo.

Mankato & Northeastern.—At the annual meeting, held at Mankato, Minn., on April 11, the following directors were elected: P. H. Carney, Henry Robel, D. L. Rose, R. Coughlan, O. Cassidy, I. N. Flanigan, Dr. P. Follman, John Klein, F. Kron, J. G. Fowler, of Mankato; Peter Kremer, of Minnesota Lake; T. S. Willcox, of Kasota; J. W. Chambers, of Cleveland; Jacob Krenik of Le Sueur Center; and Joseph M. Kremer, of New Market, Minn.

New York Central & Hudson River.—G. E. Ellis, Inspector of Signals on the Western Division, will become Assistant Superintendent of Signals on the Hudson River Division on May 1.

Ohio Southern.—The following directors were elected at the annual meeting held in Springfield, O., April 16: Fred H. Alms, H. B. Morehead, Joseph R. Megrue, Cincinnati; George H. Frey and George W. Saul, Springfield; Mills W. Barse, Buffalo; James Bryar, F. A. Barnaby, and S. Beymer, New York City.

The general offices of the company have been moved from Springfield to Lima, Ohio.

Philadelphia & Reading.—John F. Auch has been appointed Assistant General Freight Agent, with office at Reading Terminal, Philadelphia, vice F. W. Stone, resigned. R. L. Russell has been appointed Freight Claim Agent, with office at Reading Terminal, Philadelphia, vice George S. Costa, who has been appointed Division Freight Agent at 504 Market street, Harrisburg, Pa., vice John F. Auch, assigned to other duties. Mr. Costa, in addition to his duties as above, has also been appointed General Eastern Agent of the Southern States Dispatch.

Pittsburgh, Cincinnati, Chicago & St. Louis.—P. A. Bonebrake, Chief Dispatcher and Passenger Trainmaster of the Pittsburgh Division, has been appointed Superintendent of the Louisville Division, to succeed H. I. Miller, resigned.

Queen & Crescent.—John Menzies has been appointed General Eastern Agent, with headquarters at 343 Broadway, New York City. Mr. Menzies was formerly General Contracting Agent for the Louisville Southern.

Terre Haute & Indianapolis.—The office of the Engineer of Maintenance of Way of the Michigan Division has been removed from Terre Haute to Logansport, Ind.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Altoona & Philipsburg Connecting.—On April 9 a passenger train each way was put on between Philipsburg and Mapleton, Pa., a distance of four miles. It is expected that trains will run through to Ramey, 15 miles from Philipsburg, inside of two weeks. Coal shippers and business men along this new line will petition the State Supreme Court to reconsider its recent action in compelling the company to build overhead crossings at all points where its tracks cross the tracks of the Pennsylvania, especially at unimportant points.

Bangor & Aroostook.—No surveys have yet been made for the branch to Patten, Me., but the line will probably be built this summer. The town of Patten a few weeks ago voted $18,000 to aid the construction of the branch, and the company is expected to accept the town's aid. From Crystal Station, on the main line, to Patten is about five miles. The country is quite favorable for a railroad with good alignment and easy grades and with very few, if any, bridges.

Buffalo & Susquehanna.—The contracts for the extension of this line to connect with the Fall Brook Railroad were awarded some weeks ago, as noted at the time, and the contractors now have a large force of men at work on the grading. The line is 13 miles long from Galeton to Ansonia, Pa. The contract was let in sections, the Galeton section being awarded to Frank Greco, of Galeton, Pa., and the Ansonia extension to D. A. Crage, of Buffalo and Gaines, Pa. C. W. Goodyear is manager of the railroad.

Carbon Limestone.—This company has been organized in Pennsylvania to build a road beginning in the township of Mahoning, Lawrence County, at the terminus of the Mahoning State Line Railroad near the Ohio state line, and thence southerly to the limestone quarry on the property of Isaac R. Mills in the township of Mahoning. The length of road is two miles, all in Lawrence County, Pa. Capital stock $20,000. James H. Reed, of Pittsburgh, is President, and John G. Robinson and Randon Evans, of Pittsburgh, and James M. Bailey, of Allegheny, are directors.

Clearfield, Conemaugh & Western.—Surveys for the newly incorporated line have been completed from Clearfield, along Big Clearfield Creek to Glen Hope, and this work is now progressing to Irvona, thence by South Blacklick and by Hinckston's Run to Johnstown, Pa. The line will connect with both the Beech Creek and Baltimore & Ohio, and pierce a fine mineral section of Cambria and Clearfield counties. Hon. Samuel J. M. McCarrell, of Harrisburg, Pa., is President, and Samuel Brugger, of Flemington, Pa., Chief Engineer.

Columbus, Hocking Valley & Athens.—Articles of incorporation were filed with the Secretary of State of Ohio by the above company this week. The incorporators are: Elias M. Poston, George W. Lamb, Andrew Bauman, Charles B. Cowan and Andrew B. Horne; and the road is to pass through the counties of Fairfield, Franklin, Hocking and Athens, a distance of 42 miles, into the Hocking Valley coalfields. The construction of the road will depend on whether the Ohio Legislature passes a bill leasing the Hocking Canal bank to the company for 99 years. There is no opposition to its being leased, but there is a fight against the yearly rental being only $6,000, it being claimed that the canal bank is worth at least $400,000 instead of $100,000. The road will parallel the Columbus, Hocking Valley & Toledo, but will be intended more for local than for through coal traffic to the lakes. Very little grading would have to be done. The work of constructing the road must, according to the bill before the Legislature, begin within six months after the bill's passage, and be completed within two years.

Dakota, Wyoming & Missouri River.—The officers of this road in South Dakota are confident that at least 50 miles of the line toward Chamberlain, S. D., will be completed this year. The line is now graded for some miles east of Mystic City, and when the track is laid on this section the extension east of Rapid City toward the Missouri River, which will be reached at Chamberlain, will be begun. The surveys for the line have been completed west of Rapid City to the coalfields in Wyoming and east to Chamberlain. W. T. Coad, of Rapid City, is President; F. O. Murdoch, of Chicago, is Secretary; and W. M. Wright, of Rapid City, is the Chief Engineer.

Florence & Cripple Creek.—Tracklaying has reached Robinson, 20 miles north from Florence, Col., and the line will be opened for traffic to that point this week. The company will build a station freight-house, side tracks to accommodate business, and a stage line will be put on to connect with the Cripple Creek mines.

Galveston & Great Northern.—President Edward Roemer, of New York, is now in Texas, completing the organization of the company. He states that charters have been obtained through Nebraska and Kansas and Oklahoma Territory. The survey has been made to the Canadian River, and will be continued as soon as can be arranged. The proposed northern terminus is Niobrara, Neb., and the line is to be built south through Nebraska, Kansas, Oklahoma and the coalfields of the Indian Territory to Denison. P. J. Dougherty, of New York; D. F. O'Rourke, of Altoona, Pa., and J. G. Clark, of Sterling, Kan., Mr. Roemer says, are associated with him in the enterprise.

Interoceanic.—This company, which has already secured a charter in Arkansas and other states, was incorporated in Oklahoma Territory last week by S. L. Schellenberger, of Little Rock, and others named in the Arkansas charter.

Lake Katrine.—This is the title of a railroad company recently organized which proposes to build a railroad connecting Rondout and Lake Katrine, N. Y. Lake Katrine is a popular summer resort, situate about five miles from Kingston City. It is understood that already nearly $50,000 has been subscribed to carry out the project.

La Porte, Houston & Northern.—The construction material for completing this road into La Porte, Tex., has been shipped from New York and is expected to arrive at Galveston within a week. General Manager Lee completed all arrangements during his recent visit to New York to build the line into La Porte. The road now in operation extends from Harrisburgh, the junction with the International & Great Northern near Houston, Tex., to Deer Park, about 10 miles. The line has been graded through to La Porte, seven miles farther. A trestle across Simm's Bayou, 400 ft. long, is the only work to be completed besides the tracklaying.

Mexican Central.—By mutual agreement the company has been relieved by the Mexican Government of the obligation to extend its line from Guadalajara to the Pacific Coast. The Government has ordered that the $25,000 deposited as a guarantee be returned to the company.

Midland Terminal.—The following account of this road describes very well what has been accomplished in the construction of the road, and the work now being finished, and although most of the information has already been given in this column, is published in this form as being an interesting summary of an important, if not very long, line. The operated line extends from Divide, Col., a station on the Colorado Midland, 27.8 miles west of Colorado Springs, south to Midland Col., a point seven miles south of Divide. The extension to the Cripple Creek mines is from Midland Junction, a point one mile north of Midland, to Cripple Creek, about 20 miles from Midland via proposed line, and to Canon City, Col., about 30 miles south of Cripple Creek, where connection is made with the Canon City branch of the Santa Fe road. A surveying party is now in the field near Midland, one near Gillett (about five miles from Cripple Creek), and the officers have just called in one party from the proposed Canon City extension.

Contracts have been let for the work from Midland Junction to Cripple Creek, and about one-half the grade between these two points is ready for the rails; tracklaying will be commenced in a few days. Clough & Davidson, who have the grading contract between Midland Junction and Cripple Creek, have at work the following sub-contractors: Straw & Gideon, Foley & Egan, Straw Bros., and Straw & McKenzie. W. A. Anderson has the bridge contract for this same portion of the line. There are at present about 750 men at work on the grade and bridges. The heaviest portion of the work on the extension is completed, with the exception of a tunnel 500 ft. long, work on which is being carried on night and day. The maximum grade is about 185 ft. to the mile and the maximum curvature is 16 deg. There are no iron bridges, but about 10 important trestles, the longest of which is 375 ft. Capital has been subscribed for the completion of the line to Cripple Creek, but arrangements have not yet been completed for the proposed extension to Canon City. The road when completed will form a belt line around the rich gold mining camp of Cripple Creek, tapping nearly all the largest and richest mines in the Cripple Creek district. Leaving Divide the line passes through Midland Junction, Midland, Gillett, Grassy, Altman, Victor, Arequa, Anaconda, Barry and Cripple Creek. H. Colbran, of Denver, is President of the company and R. Newell, Jr., of Midland, Col., is Superintendent and Chief Engineer.

Minneapolis, St. Paul & Sault Ste. Marie.—An officer of this company is quoted as stating that work will probably be commenced this spring on the extension to Bismarck, N. D., about 100 miles. Fully one-half the distance between Kulm and Bismarck was graded several years ago, when the Aberdeen, Bismarck & Northwestern was being built. Much of the work done on this line will greatly reduce the cost and labor of extending the line from Kulm to Bismarck. This was the main line till last year, when the extension was built northwest from Hankinson, N. D., to connect with the Canadian Pacific.

Petersburgh.—A belt line is to be built around Petersburgh, Va., by this company, and it is now endeavoring to purchase from the city about five acres of land in the southwest part of the city which will be needed when the belt line is constructed. The City Council of Petersburgh is expected to take action on the application this week. It is said that the cost of constructing the belt line and of the improvements to be made in connection will be over $200,000.

Pittsburgh, Brownsville & State Line.—This road has been recently organized as a continuation of the Pittsburgh, Virginia & Charleston, which is now built to West Brownsville, Pa. That line is operated by the Pennsylvania and an extension into Southern Fayette County has been long projected. That company had authority to build from Brownsville to the state line, but to avoid litigation on the ground of alleged abandonment of that portion of the road, it was decided to secure a new charter to cover the uncompleted part of the road. The line has been located and a route adopted from West Brownsville to the state line along the left or west bank of the Monongahela River as far as New Geneva, Pa. This work was to have been undertaken this season, but it has been recently decided to postpone all the work for another year.

Red River & Southwestern.—W. A. Squires, of Henrietta, Tex., one of the chief projectors of this road, tells the local newspapers that he has been negotiating with eastern people for building the road, and that he is to immediately make a trip to New York when he expects to make some definite agreement. The road he projects is to extend from Henrietta via Abilene to San Angelo, Tex., something over 100 miles.

Southern Pennsylvania Railway & Mining Co.—Attorneys for Col. Thomas B. Kennedy, President of the Cumberland Valley Railroad, has presented a petition to the State Court from him as president of the Southern Pennsylvania Railway & Mining Co., which owns a short line from Marion, on the Cumberland Valley Railroad, to Richmond Furnace, to condemn that portion of the old South Pennsylvania roadbed lying between Tuscarora Tunnel, in Franklin County, and Mt. Dallas, in Bedford County, Pa., about 40 miles. The corporation hroposes to construct a railroad between the two points, using the roadbed of the South Pennsylvania from Tuscarora Tunnel east. The same corporation has surveyed a branch to intersect the main line of the Cumberland Valley near Newville. The line from Richmond to Tuscarora Tunnel will be 80 miles, making the extension to Mt. Dallas 100 miles.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—A general reorganization committee has been formed by large security holders of the company to formulate plans for the reorganization of the company. The Committee is as follows: R. Somers Hayes, L. A. Von Hoffman, Edward N. Gibbs, Frederic P. Olcott, Louis Fitzgerald, George G. Haven and Adrian Iselin, Jr., of New York, and William Rotch and B. Rodman Weld, of Boston. Herman Kobbe is Secretary. Mr. Hayes, the Chairman of the Committee, is President of the St. Paul & Duluth road and Joint Receiver of the Central of Georgia. The other members of the Committee are well-known bankers and financiers.

The following table gives the earnings and expenses of this system and of the St. Louis & San Francisco for the month of February and for the eight months of the fiscal year:

	1894.	1893.	Decrease
Month of February:			
Oper. mileage	7,480	7,480	.....
Gross earnings	$2,250,471	$2,980,773	$721,302
Oper. expenses	1,882,408	2,303,903	421,495
Net earnings	$377,063	$676,870	$299,807
Eight months to Feb. 28:			
Gross earnings	$24,259,486	$27,860,141	$3,600,655
Oper. expenses	16,740,907	19,284,494	2,543,587
Net earnings	$7,518,579	$8,575,647	$1,057,068
ST. LOUIS & SAN FRANCISCO.			
Month of February:			
Oper. mileage	1,864	1,864	.....
Gross earn	$551,244	$658,107	$106,863
Oper. expen	421,755	478,824	57,069
Net earn	$129,489	$179,283	$49,794
Eight months to Feb. 28:			
Gross earn	$5,365,418	$6,425,066	$1,059,648
Oper. expen	3,655,454	4,069,138	413,684
Net earn	$1,709,964	$2,355,928	$645,964
ATCHISON, TOPEKA & SANTA FE SYSTEM.			
Month of February:			
Oper. mileage	9,344	9,344	.....
Gross earn	$2,810,716	$3,638,880	$828,164
Oper. expen	2,304,163	2,782,727	478,564
Net earn	$506,553	$856,153	$349.600
Eight months to Feb. 28:			
Gross earn	$29,624,904	$34,285,207	$4.660,303
Oper. expen	20,396,361	23,353,631	2,957,270
Net earn	$9,228,543	$10,931,576	$1,703,033

Great Northern.—The statement for the month of March is as follows:

	1894.	1893.	Inc. or dec.
S. P., M. & M. leased lines	$762,383	$1,077,603	D. $315,221
Eastern Ry. of Minn	53,874	69,265	D. 15,391
Montana Central Ry	132,564	104,461	I. 28,102
Total for system	$948,821	$1,251,331	D. $302,510
For nine months:			
St. P., M. & M. leased lines	$9,804,178	$10,777,688	D. $973,510
Eastern Ry. of Minn	1,040,671	1,078,976	D. 38,305
Montana Central Ry	895,571	906,485	D. 10,914
Total for system	$11,740,420	$12,763,149	D. $1,022,729

Lancaster & Reading Narrow Gage.—The trustees under the first mortgage bonds who have been operating the Quarryville division of this railroad since last July announce that the property of the company will be sold at Philadelphia on June 5. The road was operated for many years by the Philadelphia & Reading and was one of the several small roads which the Receivers last summer surrendered to their stockholders. Since then the road has been operated by the trustees, but with monthly deficits. The line is 15 miles long from Lancaster to Quarryville, Pa.

Long Island.—Austin Corbin, President of the company, announces that the Board of Directors have declared a quarterly dividend of one per cent., payable May 1, instead of 1¼, as heretofore. This action has been taken in view of the general depression in business, and consequent decrease in earnings, which this company has suffered in common with other railroads, together with the extraordinary expenses connected with the claims on account of the accidents last summer, now largely adjusted. For these reasons it is deemed more prudent to reduce the dividend until an improvement in the general business, with increased earnings, shall warrant a return to the former rate.

Louisville Southern.—The Louisville bondholders are now divided in regard to accepting the modified terms proposed by Drexel, Morgan & Co. under the new reorganization scheme. A large number of bondholders have decided to accept the terms offered, but others are opposed to doing so. Certain of these latter have replied to the United States Circuit Court at Cincinnati asking that the present lease with the East Tennessee, Virginia & Georgia be abrogated and that the property be transferred to the control of the first mortgage bondholders.

Minnesota, Wisconsin & Pacific.—This road has been reorganized under the laws of Minnesota and the following officers elected: President, R. R. Cable, Chicago; Vice-President, A. E. Clarke, Minneapolis; Secretary, L. B. Arnold. The bonds are owned by the Chicago, Rock Island & Pacific and the road has been and will continue to be operated by the Minneapolis & St. Louis. It comprises 216 miles of main line—Morton, Minn., to Watertown, S. D., 122 miles, and from Mankato to Red Wing, Minn., 94 miles.

New York, Ontario & Western.—Burke Bros. have a contract to deepen 10 ft. the large cut south of Hurleyville, N. Y. The earth removed from this cut will be used to fill two trestles and to raise the track. The

contractors are already on the ground with a locomotive and cars of their own, and work will commence at once.

New York Central & Hudson River.—The report of March earnings shows a decrease nearly twice as great as that reported in February, when the loss in gross was $281,061. The following statement gives the earnings for various periods:

	1894.	1893.	Inc. or dec.
Month of March:			
Miles operated	2,395	2,096	I. 299
Gross earn	$3,547,767	$3,965,464	D. $417,697
Three months to March 31:			
Gross earnings	$9,722,854	$10,706,859	D. $984,005
Nine months to March 31:			
Gross earn	$33,762,613	$34,972,740	D. $1,210,127

Northern Pacific.—Judge Jenkins, of the United States Court at Milwaukee, issued a decision this week denying the petition of the President and Directors of the Northern Pacific asking for the appointment of two masters in chancery to take testimony looking to the removal of the three Receivers, Messrs Oakes, Payne and Rouse. Judge Jenkins' decision, which was a long one, took the ground that it would be unjust to remove the Receivers. The point touching the Rocky Fork coal contract, wherein a contract was made by which the road was to be supplied with coal for 99 years, was referred to a master, on which testimony will be taken. The Judge remarked that the duty Receiver Oakes had resting on him in making the contract was to see that the road got as favorable a contract as possible. In the case of the Northern Pacific and Manitoba Branch, a master is appointed to take testimony. This branch, it was charged, was built by certain directors and sold to the company. The Judge remarked that it appeared that the directors realized a large sum by the sale. The charges on which the removal of Mr. Oakes was asked were, first, that during his office he consented to the building of branch lines of little value, and second, that he assented to the purchase of others at exorbitant prices and with the knowledge that some of the directors were pecuniarily interested. Taking up these two propositions, Judge Jenkins said that the lines, though unprofitable for a while, were necessary to the system. The directors approved of the construction of the lines, and it would be unjust to Mr. Oakes to charge him with the fault when the officers and directors joined in approving the policy. Coming down to the charges of recklessness of Mr. Oakes with regard to the construction and acquisition of the branches in Washington, Oregon, Montana and Idaho, Judge Jenkins, after an explanation of each one, said the lines were built as feeders, and owing to the sparsely settled district, were necessarily built for the future. The financial depression was also largely accountable for the fact that the plans had gone astray. If Mr. Oakes was to be removed on these charges, then it would make the entire board of directors of the company at that time liable to impeachment.

Ohio Southern.—At the stockholders' meeting at Columbus, O., on April 16 it was decided to increate the capital stock from $4,000,000 to $8,000,000. The net earnings last year were $343,219.

Pacific Railroads' Debt to the Government.—Wade Hampton, Commissioner of Railroads, has laid before the House Committee on Pacific Railroads his views on the subject of the railroads' indebtedness to the Government. We give herewith the press report, which shows it to be one of the clearest summaries of this complicated matter that has been made. Gen. Hampton begins with the statement that when the indebtedness matures, three forms of settlement will be presented. 1. Foreclosure. 2. Maintain the sinking fund and require that a larger percentage of net earnings be paid into it. 3. Refund the debt. He is opposed to a foreclosure. "A foreclosure," he says, "will not satisfy the debt, as a sale of the subsidized lines under decree of court would not realize more than enough to cancel the amount of the first mortgage bonds, in which case the United States would be required either to lose the claim, or buy in the lines and pay off the first mortgage indebtedness. An estimate of the cost of reproducing the roads was made by Mr. Richard P. Morgan, in 1887, as follows: Union Pacific, 1,038 miles, $38,157,500; Kansas Pacific, 394 miles, $21,907,870; Central Branch, 100 miles, $2,004,000; Central Pacific, including Western Pacific, 860 miles, $38,972,920; Sioux City & Pacific, 102 miles, $2,372,700; total, 2,494 miles, $103,414,990.

"It will be seen from the foregoing that a deficiency judgment would have to be collected, and, for that purpose, resort must be had to the branch lines. The latter, in many cases, were built by the companies; in other cases the companies have become the owners, for the purpose of controlling the branches, of a considerable amount of their stocks and bonds. The former are of no substantial value, but some of the first mortgage bonds would be available. In the case of the Union Pacific, all of its branch line stocks and bonds, amounting to, say, $100,000,000 face value (estimated by competent financiers to be worth in the market $42,000,000), have been deposited with Messrs. Drexel, Morgan & Co. as security for the company's floating debt, say, $24,000,000. The owned branches could be bought in under judicial sale, and the equities and rights of the companies in controlled lines could be secured in the same way, by the purchase under judicial sale of the means through which the control is exercised. The properties having thus been secured, the operation of the roads would either devolve upon the government, through a board of managers or a commission, as provided in House bill No. 305, or in a lease or resale of the same to the highest responsible bidder.

"Railway management by Congress, aside from being opposed to the settled policy of the Government, would be not only a doubtful, but a dangerous, experiment. It could not well be divorced from politics, associated as the latter is with the attendant danger of a corruption of the civil service. This alternative, therefore, should be rejected."

Richmond & Danville.—Judge Goff, of the United States Circuit Court, at Richmond, Va., made a decree for the foreclosure sale of this road before July on the petition of the Central Trust Co., of New York. This decree was in accordance with the plans made for the reorganization of the Richmond Terminal System. Decrees have now been entered for the sale at foreclosure of all the roads included under the terms of the reorganization scheme.

South Carolina.—This road was sold at Charleston, S. C., on April 11, to Wheeler H. Peckham, of New York, representing the first mortgage bondholders. During the week a motion had been made before Judge Simonton at the United States Circuit Court by E. Ellery Anderson, of New York, representing certain of the second mortgage bondholders, to have the foreclosure sale postponed until next September. Judge Simonton declined the request and the property was sold as advertised for $1,000,000 to Mr. Peckham for H. W. Smith, Peter Geddes and Gustave Kissel, a syndicate of the the first mortgage bondholders.

Toronto, Hamilton & Buffalo.—An injunction has been granted at Toronto to prevent the issue of $4,000,000 of bonds by this company. It was organized some years ago to build to Toronto, but only 17 miles from Brantford has been built. The road is now controlled by Ephraim Miller, of New York, and F. C. Helm and James M. Young, of Chicago. They bought out the original promoters, who are Canadians, for $350,000. They have not paid this purchase money, although they are in possession of all the assets of the company, and the original promoters have brought this action. Miller, Helm & Young lately arranged for an issue of $4,000,000 of bonds to go on with the building of the road, work on which was recently begun at Hamilton.

Union Pacific.—The following table gives the earnings and expenses of this road for the month of February and for the two months of the fiscal year:

	1894.	1893.	Inc. or dec.
Month of February:			
Gross earn	$2,200,051	$2,857,285	D. $657,234
Oper. expen	1,738 805	2,075,408	D. 336,603
Net earn	$461,246	$781,877	D. $320,631
Two months:			
Gross earn	$4,472,692	$6,019,278	D. $1,546,586
Oper. expen	3,474,214	4,280,741	D. 806,527
Net earn	$998,478	$1,738,537	D. $740,(59

OREGON SHORT LINE & UTAH NORTHERN.

	1894.	1893.	Inc. or. dec.
Feb. gross earn	$360,026	$382,881	D. $22,855
Feb. net earn	113,926	98.298	I. 15,628
Two months' net earn	216,613	215,544	I. 1,069

UNION PACIFIC, DENVER & GULF.

	1894.	1894.	Inc. or dec.
Feb. gross earn	$215,069	$350,768	D. $135,699
Feb. net earn	33,108	69,9(0	D. 36,792
Two months' net earn	79.747	177,732	D. 97,985

The Committee on Pacific Railways in the House of Representatives has adopted a resolution instructing th e Chairman to invite the Receivers of the Union Pacific, and ex-Gov. George Hoadley, of New York, the special counsel of the United States, to appear before the House Committee and inform them as to the status of the company's affairs.

Vancouver, Klickitat & Yakima.—The sale of the property of this company is being negotiated by the local directors at Vancouver, Wash., to an Eastern firm which proposes to extend the line and develop the timber lands along the line. The road was built several years ago and is now about 15 miles long from Vancouver and has been operated by a local company chiefly as a logging line. Surveys have been made through Klickitat Pass in the Cascade Mountains to North Yakima, Wash., on the Northern Pacific.

TRAFFIC.

Traffic Notes.

It is announced that the Cincinnati, Hamilton & Dayton will soon put on two new fast passenger trains each way between Cincinnati and Toledo.

The Kansas Railroad Commissioners have asked the traffic managers of all Kansas railroads to meet April 18 to discuss the subject of a general reduction in rates. Twenty-eight counties have petitioned for a reduction.

The Railroad Commissioners of Kansas, on application of merchants of Hutchinson, ordered a reduction in the freight rate on agricultural implements C. L., from the Missouri River to Hutchinson. The reduction is about the same as that recently ordered in the Wichita case, from 33½ cents to 23 cents.

San Francisco newspapers report that the effort of the California Traffic Association to maintain a competing freight line between California and the Atlantic Coast has failed. It is now admitted that the North American Navigation Co., which was supported largely by bonuses from that association, will go out of business on May 1. At the same time it is announced that the Panama Railroad will put on a steamer between San Francisco and Panama.

The Southwestern Traffic Association met in New York last week and it was agreed to continue the present rates by the steamship lines, maintaining tariff on the basis of 35 cents per 100 lbs. (first-class) below the all-rail lines from territory east of points taking Buffalo and Pittsburgh rates to the Mississippi River. It is agreed that rates from all points west of the seaboard territory, when business is moved by the steamship lines, shall be made on a full combination of locals via New York.

The Nebraska State Board of Transportation, after several hearings, has decided to enforce the "transfer switch law," which requires a connecting track to be built between two adjacent roads wherever shippers demand it and the Board regards the demand as reasonable. Tracks were ordered laid at O'Neil and Schuyler. The Board has also held hearings in regard to the maximum rate law, known as the Newberry bill, and it is said that the Supreme Court of the state will render a decision as to the constitutionality of the law within a few weeks.

It is reported that the Lehigh Valley, Delaware, Lackawanna & Western, Central of New Jersey, New York, Ontario & Western and the Delaware & Hudson have made an agreement to maintain rates to all local points. On the recent rupture between the Lehigh Valley and Jersey Central companies, the Lehigh Valley began using the Pennsylvania station at Jersey City; as soon as this was done the Jersey Central put on additional trains, which were run faster than those of the Lehigh Valley, but the new arrangement is expected to stop this.

Chicago Traffic Matters.

CHICAGO, April 18, 1894.

The action taken by Chairman Caldwell of the Western Passenger Association regarding the payment of excessive commissions by the Union Pacific has been announced by him. At the time the westbound immigrant agreement was put through, the Union Pacific agreed not to stand in the way of its successful operation. Arrangements were made with the steamship brokers in New York, including Peter McDonald, to turn all their business through the clearing house subject to routing west of Chicago by the joint agent of the Western roads, and to accept an agreed schedule of commissions. The Union Pacific reserved the right to pay its commissions direct to the brokers, and it soon transpired that broker McDonald was sending the bulk of his business over that line. Efforts to come to a satisfactory understanding with the Union Pacific having failed, the other lines determined to either bring broker McDonald into the fold or have his scalp. They think they have his scalp; time will tell whether they have it or not. Chairman Caldwell went to New York and flatly accused him of having broken faith with the association and demanded that he stand by his agreement. This he refused to do and thereupon a formal notice of his discharge as an agent of the association lines was served on him. Further he was notified that the association lines proposed to absolutely sever all connections with him, would pay him no commission on any of his business and, as he had violated his agreement, would not pay him any commissions on such business as he had already turned over to the committe. It is announced that "measures are being perfected to protect the interests of the association lines." This means that the joint agent has been given *carte blanche* authority to offer all the other brokers better commissions than McDonald offers, and force the Union Pacific to increase its commissions to McDonald to a point where it will be obliged to take the traffic at a loss or go without it. The result of this is likely to be another break in first-class westbound rates by the Union Pacific in retaliation, and it will then be a fight of all the other lines against the Union Pacific, and the loss of a large revenue to each line west of Chicago. All this is on account of the distribution of less than 800 immigrants per month, the total number handled by all the roads from Jan. 1 to March 20 being only 2,008.

Chicago shippers are rejoicing over the collapse of the California Traffic Association, which has resulted in a restoration of class rates from New York to Pacific Coast points, effective May 1. Ever since this association forced the reduction two years ago, Chicago has been shut out of business with the Pacific Coast except on commodities on which the Atchison has equalized rates with New York, until finally all the commodity rates quoted by the Sunset route have been met from Chicago. It was impossible to meet the class rates from New York as the reduction of all intermediate rates would bring all traffic below a remunerative basis.

Below is a comparison of the old and new class rates.

	Class	1	2	3	4	5	A	B	C	D	E
From New York.	Old	1.50	1.40	1.30	1.20	1.10	1.10	1.00	1.00	1.00	1.00
	New	2.40	2.15	2.00	1.70	1.65	1.60	1.10	1.00	1.00	.95
From Chicago.	Old	2.48	2.19	2.00	1.75	1.70	1.60	1.14	1.10	1.00	.95
	New	2.40	2.15	2.00	1.70	1.65	1.60	1.10	1.00	1.00	.95

From April 16 on commodity rates, and from May 1 on class rates, the Great Northern, the Union Pacific and the Northern Pacific will put into effect the same rates from Chicago to all North Pacific Coast points. This means the reopening of this territory to Chicago and a consequent increased volume of trade is looked for.

The Western lines failing to secure the withdrawal by the Eastern lines of the differential rates shown in their rate sheets in favor of the Canadian Pacific, have determined to meet them by placing exchange orders in the hands of of all the New York ticket brokers. This action is extremely distasteful to the Eastern lines, and they are complaining that it will again utterly demoralize the situation. It would seem as though the trunk lines could ill afford to support the Canadian Pacific against all the other trans-continental lines in this matter.

The fight between the Trunk lines and the lines via St. Louis on grain seems likely to break out again, as it is reported that an undue percentage of grain is moving via St. Louis, which gives rise to suspicions of cut rates by the Big Four and Wabash. Instead of the Lake lines being a controlling factor in the rates, it now looks as though the St. Louis lines were going to make the rates this season.

Officials of the Central Traffic Association claim that both freight and passenger rates are being maintained in that territory.

The last case of the Interstate Commerce Commission against a Chicago road (that of the Wabash) has been dismissed on motion of the United States District Attorney. The case has been pending since 1892. One branch of the case having been appealed to the United States Supreme Court, where it was decided that the the defendants were not compelled to produce their books and papers, it was considered useless to press the other counts.

Chairman Midgley, of the Western Freight Association, rules that lines must not furnish two single-deck stock cars in lieu of one double-deck car at the same rates and conditions. This has been done by some of the roads and results in double mileage to the private car companies.

The Santa Fe has made a rate of $1 per train mile, short-line mileage, for the hotel men's convention at Denver next month. This means a minimum rate per passenger from Chicago of about $3.25 and a maximum of $6.25. The action is taken to meet the alleged competition of other lines.

All the Western lines have been authorized to meet the land seekers' excursion rates of the Missouri, Kansas & Texas.

The Western lines have been compelled to make a general minimum freight rate of 25 cents on account of the rules of the Illinois and Iowa State Railroad Commissions.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending April 14 amounted to 82,938 tons, against 91,975 tons during the preceding week, a decrease of 9,037 tons, and against 64,834 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W'k to Apr. 14.		W'k to Apr. 7.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	10,803	13.0	8,651	9.4
Wabash	14,517	17.5	10,376	11.3
Lake Shore & Michigan South.	8,457	10.2	14,770	15.9
Pitts., Ft. Wayne & Chicago	7,079	8.5	11,463	12.5
Pitts., Cin., Chicago & St. Louis	13,806	16.6	12,796	13.9
Baltimore & Ohio	3,966	4.8	8,388	9.1
Chicago & Grand Trunk	7,555	9.1	6,780	7.4
New York, Chic. & St. Louis	7,789	9.4	10,015	10.9
Chicago & Erie	7,539	9.1	7,390	8.1
C., C., C. & St. Louis	1,424	1.8	1,346	1.5
Totals	82,938	100.0	91,975	100.0

Of the above shipments 6.665 tons were flour, 43,625 tons grain and millstuff, 9,931 tons cured meats, 13,757 tons dressed beef, 1,079 tons butter, 1,087 tons hides and 5,162 tons lumber. The three Vanderbilt lines carried 32.6 per cent., the two Pennsylvania lines 25.1 per cent. Lake lines carried 49,806 tons against 107,610 tons the preceding week.

(Other Chicago traffic news will be found on page 289).